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FORESTRY FEB 21 1945

VETERINARY MEDICINE

MARCH 1945

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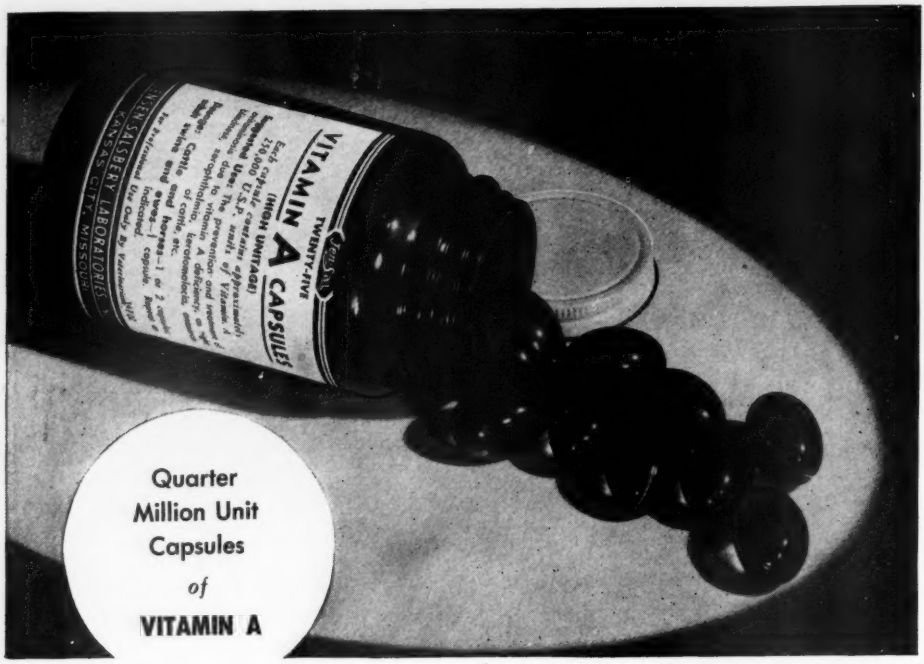
VOL. XL
No. 3

Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879.

7632 S. Cranden Ave.
Chicago 49, U.S.A.



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VOL. XL MARCH, 1945 No. 3

Published Monthly by the
VETERINARY MAGAZINE CORPORATION
7632 S. CRANDON AVE., CHICAGO 49, ILL., U.S.A.

$4.00 a year; per copy 50 cents; Special Issues $1.00

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Entered as second-class matter Nov. 8, 1920, at the post office at Chicago, Ill., under the Act of March 3, 1879. Entered as second-class matter under the title of American Journal of Veterinary Medicine July 19, 1910, at Chicago, Ill., under the Act of March 3, 1879.

D. M. CAMPBELL, *Editor*
7632 S. Crandon Ave., Chicago 49, Ill.
Telephone South Shore 7160

H. J. MOSTYN, *Eastern Representative*
P. O. Box 121, Sussex, New Jersey
Telephone Sussex 2F18

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Stocks of niacin, ascorbic acid, thiamine, riboflavin and low-potency vitamin A oil are now adequate for all needs and have been made available for feed manufacturers and suppliers of veterinary medicines.

Human brucellosis in Uruguay is almost exclusively of the abortus type and is confined almost entirely to those employed in cattle slaughtering establishments, according to a new monograph on the subject by Purriel and Espasandin. The incidence of infection among dairy cattle is high—50%—but among range cattle very low.

As a result of a malaria control test in rural Arkansas, the U. S. Public Health Service concluded that DDT may solve the malaria control problem in the South. The method used was spraying the insides of residences in a malaria area 36 square miles in extent. The buildings were unscreened. After a single spraying the average mosquito population for a period of 10 weeks was reduced 94% as compared with that of every 25th house which was left unsprayed.

BRL (barge refrigerator large) is the designation of a new type of floating refrigerator operated by the Army in the Southwest Pacific to supply troops with fresh vegetables, fruits, dairy products and meats. The barges have a special unit which manufactures 10 gallons of ice cream every seven minutes and another which manufactures five tons of ice a day. These floating cold storage plants carry the equivalent of 64 carloads of meat and 500 tons of vegetables, fruits and dairy products. They cost $1,200,000 each.

Massachusetts has just celebrated the 75th year of the establishment of a State Board of Health. This was the first such board to be organized in America.

★★★ BUY WAR BONDS ★★★
AND HOLD THEM

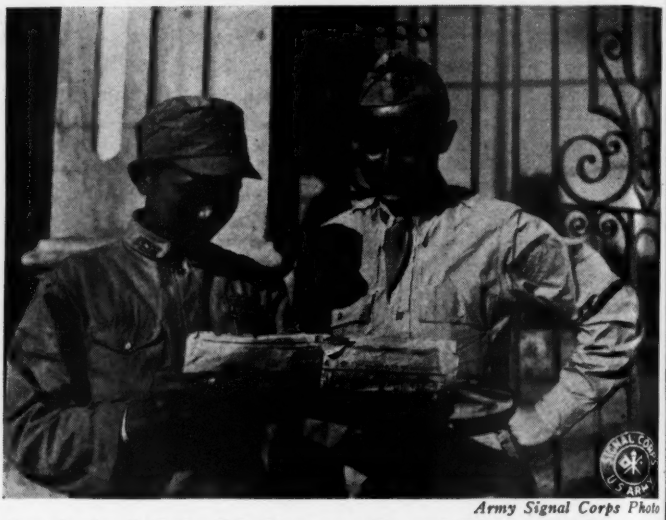
Pyridoxine, vitamin B_6, is reported by Cantor and Scott of the University of Alberta to be effective in the treatment of sulfathiazole, aspirin and thiouracil poisoning.

The per capita consumption of meat in this country in 1944 was 141 pounds, four pounds more than in 1943 and nine pounds more than the average of the five pre-war years.

Human brucellosis in Mexico, according to Casteñeda, is, in the vast majority of cases, of the melitensis (goat) variety; the percentages being: melitensis 95.2, abortus 3.5 and suis 1.3. The infection in goats is thought to be high, although precise data are lacking. Bovine brucellosis herd infection varies from 25 to 50%. About 35% of swine herds are thought to be infected.

1945 Easter Seal Sale for Crippled Children, March 1—April 1

American Veterinary Officers in the Chinese Army in the Salween Campaign



Army Signal Corps Photo

Capt. Lander A. Sacks, V.C., Montezuma, Ga., and Chinese assistant on the American Y Force in the Salween Campaign in Yunan Province, China

Capt. R. L. Prather, Eureka, Kansas, flew over the "hump" from India to China in April, 1944, and was assigned immediately to the "Y Force" the American Military Mission which trained, equipped and supplied the Chinese Expeditionary Force for the Salween Campaign. This campaign was launched against the Japs in western Yunnan in May. The objective of the campaign was to reopen the Burma (now Stilwell) Road, which was achieved in January of this year.

The Salween Campaign began in the almost trackless Kaoli Kung Mountains, where only coolies or Chinese pack horses had to be depended upon for transport over the narrow, precipitous trails and across 12,000 foot passes, an area practically unvisited by white men. Captain Prather's responsibility as a member of the American Y team was to keep the pack horses in condition to work, which was just as vital as supplies.

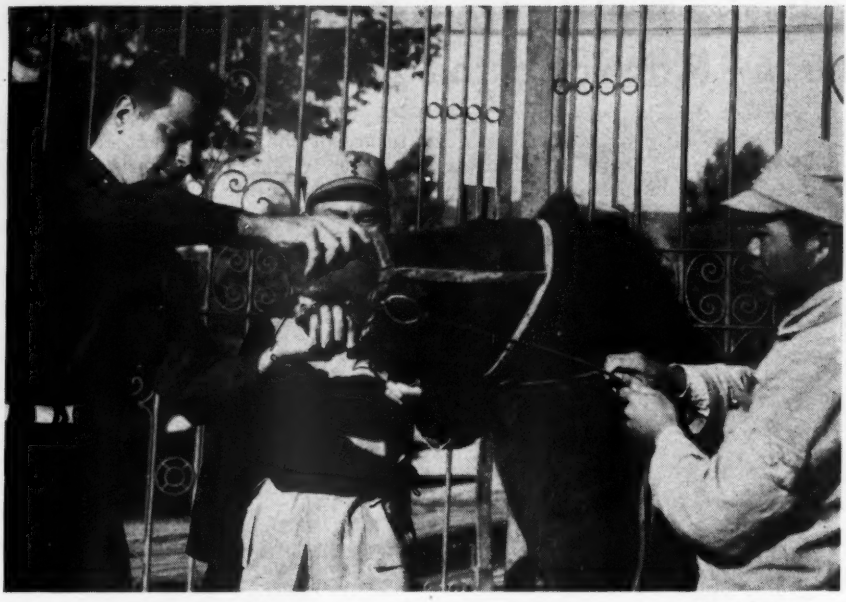
When the Chinese troops drove across the Salween River, May 11, the American team established a camp at the base of a cloud-misted peak which the enemy had fortified heavily. From their camp the Y team could see the battles which lasted for weeks. The main peak, however, proved impregnable to assault and was tunneled. Six thousand pounds of TNT, brought into the mountains like all other supplies on Captain Prather's charges, was exploded in the tunnel, precipitating the whole fortified point, including the Japs into oblivion.

To get supplies to the fighting troops Captain Prather ran pack trains up the narrow, zigzagging precipitous trails, often in monsoon rains and mud, to the front lines. Such trains were always liable to attack by Jap patrols, or the loss of drivers from sniping.

Captain Prather was graduated from the Kansas State College in 1941 and entered the Army immediately at Fort Leavenworth. Later he was assigned to a Prisoner of War Camp at Scottsbluff, Nebr., before going to India. A brother, Phillip, is a first lieutenant in the Air Transport Command in North Africa.

Capt. Lander A. Sacks, Montezuma, Ga., another veterinary officer assigned to the Y Force arrived in India in November, 1942, and spent nine months at an American camp where Chinese troops that had retreated from Burma under General Stilwell were in training. He, too, was flown over the "hump" to China and as a member of a Y team of medical, veterinary and engineer officers took part in the Salween Campaign. He also spent two months at a Y Force training camp on the French Indo-China border. During the Salween Campaign the American officers and technicians on the Y teams had the same rations as the Chinese troops—principally rice. A Y team of technical personnel is attached to each Chinese combat unit.

Captain Sacks has a brother on the Western Front, another brother in the Seabees, a cousin in a German prison camp, an aunt in the Nurse Corps in Italy and a sister-in-law in the Nurse Corps in Australia. He is an alumnus of the University of Pennsylvania, class of 1939, and has wife and daughter in Philadelphia.



Army Signal Corps Photo

Captain Prather examining a Chinese pack pony. Pack animals were so scarce that a few oxen and even cows were used to transport American mountain artillery. It was extremely necessary to keep the transport flowing forward and the Chinese troops attached extraordinary importance to the work of the veterinary officers

The Y Force is the world's largest military mission. Its purpose is to improve the combat efficiency of the Chinese Expeditionary Force. 1st Lieut. James K. Hill, V.C., Adel, Ia., is the veterinarian at the Field Artillery Training Center of the Y Force. At this center, Chinese soldiers, some of whom walk as much as a thousand miles to get there, are taught every phase of artillery employment, mainly using the American-made 75-millimeter pack howitzer. This weapon is virtually the only artillery piece usable in the rugged, almost trackless mountain terrain of Western Yunnan Province.

As all of this artillery is packed through the mountains on the backs of the diminutive Chinese horses, it is necessary that they be in good condition to stand this strenuous work and that is Lieutenant Hill's responsibility.

Some of the Chinese units trained at the F.A.T.C. proved the success of Y-Force in the Salween River Campaign, where they pushed the Japanese out of Western Yunnan, making possible a link of the old Burma Road with the new Ledo Road hacked out of the jungles of North Burma. It provides China with her first overland supply line since the Japanese occupied Burma and Western China early in 1942.

Lieutenant Hill is a graduate of the Iowa State College. He entered the Army in May, 1943, and was ordered overseas in January, 1944. After spending a short time in India he was sent to China and assigned to Y-Force. Mrs. Hill is living at 130 75th St., Brooklyn, N. Y., while the lieutenant is overseas.

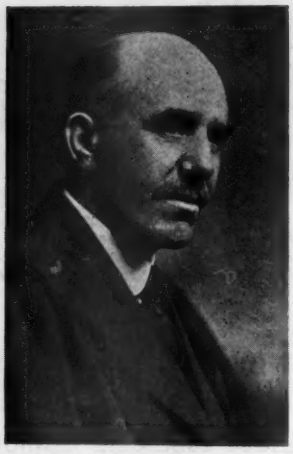
Preventive Medicine Instituted in the Philippines

When our troops landed in the Philippines they found that the civilian population had suffered woefully for lack of a preventive medicine program under Japanese domination. Sanitation had deteriorated. Food was inadequate. Great numbers of the people were suffering from tropical ulcers, yaws, intestinal diseases and vitamin deficiency diseases. They were endangered by cholera, smallpox and typhoid fever. Now, with the return of our troops, preventive medicine is again being practiced in the islands. Carrying out plans prepared by the Civil Public Health Division of the Preventive Medicine Service, Office of The Surgeon General, sanitation is being restored. The people are being immunized against diseases. Health offices have been reestablished in the majority of communities wrested from the Japs and dental clinics, dispensaries and hospitals have been established. —*Office of the Surgeon General of the Army.*

★ ★ ★ BUY WAR BONDS ★ ★ ★
AND HOLD THEM

McGilvray Retires from Ontario Veterinary College—MacNabb the New Principal

Having reached the allotted span of three score and 10 years with an additional three years for good measure, Dr. C. D. McGilvray will retire from the principalship of the Ontario Veterinary College June 1st next. Doctor McGilvray is the third principal of the Canadian school, the second oldest veterinary college in North America and, like both his predecessors, Andrew Smith and E. A. A. Grange, was born in Scotland. He has held the office since September 1st, 1918—27 years.



Charles D. McGilvray

Doctor McGilvray's career has been crowded with activity. Born in Glasgow of the Clan McGillivray he came to Canada with his father's family in 1886 and settled in Manitoba. The next 12 years were spent principally at work in general stores in Manitoba and Saskatchewan but he found time to homestead in both provinces. Matriculating at the Ontario Veterinary College in 1898, he was graduated in 1900 and spent the following year at the McKillip Veterinary College. Then followed 17 busy years in educational and livestock sanitary work, including: Special Lecture and Demonstrator in Veterinary Science and Animal Husbandry in the Northwest, and introducing livestock judging schools and short courses in Alberta and Saskatchewan. In 1905 he was appointed Chief Veterinary Inspector and Livestock Director under the Dominion Department of Agriculture. To these duties were added in 1907 those of Inspector in Charge of Quarantine Stations and of meat inspection at the packing houses of western Canada. This position he relinquished to accept the appointment at the veterinary college. While Chief Veterinary Inspector he had charge of the eradication of glanders and the control of hog cholera, mange and bovine tuberculosis.

Andrew L. MacNabb

Doctor McGilvray early developed a penchant for collecting scholarship medals including highest standing and prizes for diligence and proficiency at the Church of Scotland Training School of Glasgow. Graduating with highest honors and being awarded the gold medal for general proficiency, gold medal for anatomy and dissected specimens, silver medal in physiology and first prizes in chemistry, pathology and general therapeutics at the Ontario Veterinary College; also highest honors in proficiency and first prizes in pathology, bacteriology and special therapeutics at McKillip Veterinary College.

When Dr. C. D. McGilvray retires next June on superannuation he will be succeeded, as principal of the Ontario Veterinary College at Guelph, by Andrew Leslie MacNabb, who will be the fourth to hold that position since the school was organized in 1862. Doctor MacNabb is a graduate (1923) of the school he will now head, but in recent years has been engaged in public health work in Ontario; having entered the provincial health department as bacteriologist, and been promoted rapidly to the position of Director of Laboratories. He has been a frequent contributor to public health literature over the past dozen years

and belongs to numerous scientific associations, including the Ontario Veterinary Association.

An intimate veterinary friend, a sort of mentor of the new principal appraises him thus: "MacNabb is an amazing young man, just off 40 years; red-headed, blue-eyed, sound in mind and limb and a willing worker. Though Canadian born, he is a Scotsman still, the son of a Scotch 'meenister.' He is in the top echelon of scientists and research workers, yet never happier than when in an uptodate dairy barn talking pedigrees and performance to a herdsman. He is an inveterate attendant at sales of pedigreed cattle—at one sale he was 'ribbed' unmercifully by ringsiders for paying $1000 for a lame bull. Those wise in bull lore were certain the animal would never breed. The best offer MacNabb could get for this bull a year later was $12,000.

"While basking in the sunshine of achievements in human medicine and public health, MacNabb never forgot he was a veterinarian. On every possible occasion he attended veterinary meetings and contributed to the program. When an appointment of meat inspector or milk inspector was made in the health department he saw to it that the appointee was a veterinarian. He accepts his new appointment with keen enthusiasm and will contribute much to the progress of veterinary science on the North American continent."

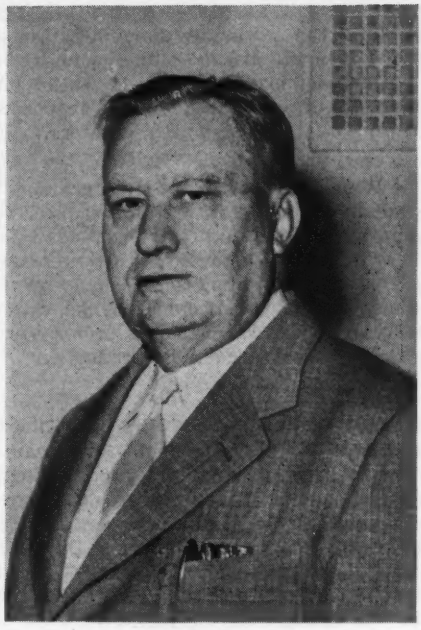
The position of Principal of the Ontario Veterinary College carries with it, in addition to direction of the college, supervision of the health of animals on government farms in Ontario and director of veterinary research in the province.

Doctor MacNabb is a veteran of World War I, and Laboratory Consultant to the Canadian Army in this war, with the rank of Lieutenant Colonel.

To the Graduate

"To cope fully with the various demands the profession [veterinary] must maintain a high standard of efficiency in all its branches, and the benefits of preventive medicine more advocated. Every veterinarian should endeavor to educate his clients on the various diseases of live stock which are preventable, special emphasis being placed on the value of inoculation of animals against blackleg and hemorrhagic septicemia of cattle, white scours of calves and joint-ill in foals. Also more attention should be given to the control of tuberculosis and contagious abortion."—Principal McGilvray to the graduating class of the Ontario Veterinary College, *The Canadian Vet. Rec.*, Nov., 1920.

Dean Brumley Dies



Oscar Victor Brumley, 1876-1945

Dr. O. V. Brumley, Dean of the College of Veterinary Medicine, The Ohio State University, died at his home in Columbus, January 14, 1945.

Doctor Brumley was born at Leipsic, Ohio, March 9, 1876, and was graduated in 1897 from the school with which he was to spend his whole professional career. He joined the faculty of Ohio State in 1898 and on a leave of absence spent a year in graduate work at the Royal Veterinary College of Berlin, 1901-1902. He was promoted to the position of Professor of Surgery and Director of Clinics in 1910, became secretary of the school in 1912 and dean in 1929, filling the latter position with distinction for 26 years, thus rounding out almost 47 years on the same faculty.

Doctor Brumley was active in veterinary organizations which he served in various capacities including: secretary (1910-12) and president (1920) of the Ohio State Veterinary Medical Association, and chairman of the Executive Board, and of the Board of Governors (1941-44) and President (1937-38) of the A.V.M.A.

He had been President of the Columbus Board of Health since 1931. He was author of two veterinary textbooks, Posology and Prescriptions (1912) and Diseases of Small Domestic Animals (1921) the fourth revision of which appeared in 1943.

The consumption of fluid milk and cream averaged 411 pounds per person in the U. S. during 1945. The Bureau of Agricultural Economics U.S.D.A. estimate that milk production for 1945 will be 119 billion pounds, one billion pounds more than in 1944. Butter production will be less than last year; evaporated milk and whole milk powder greater.

* * * *

The Wisconsin experiment station found, as a result of a long term test, that it pays well to plow up, fertilize and reseed grassland pastures with a grass-legume mixture every four to six years. This applies, of course, only to land not subject to erosion. Of the various mixtures tried in Wisconsin, a brome grass-alfalfa mixture proved most productive.

* * * *

Bovine T.B. Scores Zero in Two States

In a recent report of the U. S. Bureau of Animal Industry, summarizing progress in the campaign against bovine tuberculosis, three significant zeros appear in a tabulation of official testing. The zeros represent the entire absence of tuberculin-test reactors in Georgia, Nevada, and the District of Columbia, for the fiscal year ended June 30, 1944.

Though these areas represent a relatively small part of the United States, they support the belief of veterinarians that bovine tuberculosis can be entirely eradicated by continued testing and removal of all reactors. Several other states almost reached the same goal. In Mississippi the reactors numbered but slightly more than one in ten thousand animals tested.

Following is a summary of the states in which bovine tuberculosis is now practically non-existent, according to the report.

State	Cattle Tested	Reactors Found	Per Cent Reactors
Georgia	17,454	0	.00
Nevada	2,926	0	.00
Dist. of Columbia	639	0	.00
Mississippi	28,019	3	.01
Montana	26,399	7	.02
Missouri	24,914	9	.04
Tennessee	15,131	6	.04
Maine	23,574	11	.05
Florida	60,077	33	.05

In five additional states—Delaware, Idaho, Ohio, Oklahoma, and West Virginia—the degree of infection was also less than 0.1%. The average figure for the 48 States, Hawaii, and Puerto Rico was 0.21%.

Abundant medical and veterinary evidence has shown that the decline in tuberculosis of cattle during the last few decades has been accompanied by a marked reduction in the extent of human tuberculosis.

It is estimated that processors of dairy products will require $360,000,000 dollars worth of new equipment at the war's end. Dairymen, too, will need an enormous amount of new equipment, including an estimated $32,000,000 worth of milking machines.

* * * *

In the United Nations' postwar nutrition program it is pointed out that the span of life in leading dairy-producing countries such as Denmark, New Zealand, and Northern United States, is several years longer than in countries where cereals are the chief constituents in the diet and milk and other dairy products are little used.

* * * *

"Livestock and Meat" is a new, 16 mm., educational, sound film available from the agricultural research department of Swift and Company. It tells "the story of the tremendous job of getting livestock to the United States and developing the system of production, processing and marketing we have today." The film runs 49 minutes on the screen.

* * * *

A. Peterburgsky, a Russian scientist, announces having increased the milk production of cows up to 69%, the productivity of laying hens, and having transformed many non-breeding mares into good breeders by giving them dilute doses of cytotoxin. Ten-week-old pigs, injected with moderate doses of cytotoxin, averaged in weight 20% more than untreated controls at the end of seven months.

* * * *

To serve fluid milk to camps in all parts of the country the Army ships fresh, pasteurized milk in quart packages, loaded in express cars refrigerated by dry ice, as far as 2000 miles. This milk is consumed five to 10 days after it is produced. It is in good condition after a lapse of an even greater period if properly produced, properly processed and maintained under proper refrigeration.

* * * *

Veterinarians are as much a part of the livestock industry as the livestock growers themselves. We have specialized in disease prevention, hygiene, nutrition and animal husbandry. The grower of purebred animals has specialized in the production of sires. He does not produce beef as such but makes possible better production by others. Veterinarians, by keeping disease out of the country and by eradicating it when it does make an appearance, make it possible for the livestock raiser to keep more animals alive.—*W. J Butler.*

Infectious Enteritides of Swine

Notwithstanding the lack of agreement as to the value of common salt in the treatment of swine dysentery or infectious hemorrhagic enteritis, its use is extending among veterinarians and at present it is probably the most popular therapy in this disease.

The same treatment, with the emphasis on oats instead of buttermilk as the excipient, is achieving considerable popularity in the treatment of necrotic enteritis due to the *Salmonella choleraesuis.*

Different methods of administering salt are:

1. Koen method.

When called to see pigs, that are scouring black or brown fecal matter, the indications are that the trouble is hemorrhagic dysentery or "bloody diarrhea." If this trouble has just started the following treatment is recommended:

1. Take all feed away for 24 hours and during this period give only sodium bicarbonate in drinking water, one pound of baking soda for each five gallons of water. Give the pigs all they will drink.

2. Starting 24 hours later all corn, all green stuff, and following of cattle should all be stopped. Do not give the pigs all they will eat of any kind of diet. The inflamed intestines need rest and should not be called upon to digest all the pig will eat, for usually the appetite is as good as that of well pigs. The treatment is as follows:

Soak 1½ bushels of oats in 15 gallons of water to which three pounds of coarse salt has been added. It is much better to medicate this salt with iron oxide which is an astringent and aids in closing the ruptured capillaries that are bleeding into the intestines. Let the oats soak for 12 hours in this salt solution. At feeding time add one pint of intestinal astringent (iron oxide) to the soaked oats. In case an alkaline solution is used do not call it by that, call it an intestinal astringent and let the owner understand its purpose is to help stop the bleeding into the intestines.

At noon each day feed salted buttermilk, one pound of the medicated salt in five gallons of dilute buttermilk. Let the pigs drink all of this they will. This will increase the amount of salt the pigs get, will cause them to drink a great deal more water, and this combination, together with a starvation diet will do more to correct the hemorrhagic dysentery than anything else that can be given to the pigs.

Keep all the fresh water before the pigs they can drink at all times. Give the salted oats and the salted buttermilk with the intestinal astringent, added fresh at each feeding time, for five days. At the end of the five-day period, discontinue the salt but continue all else in just the same manner. After a three-day rest from the salt, put back on the soaked oats again and continue for another five days as at first. By the end of the second five-day period there will probably be no scours, the pigs will be very hungry and *great care* must be exercised not to overfeed them at this stage for it is easy to cause a relapse and cause the pigs to scour again by injudicious feeding at this time.

It will be much better to continue soaking the oats to which at first is added just a little shelled corn, letting the corn and oats soak in the salt water for 12 hours before feeding. Bring the pigs back to a full feed of corn by adding a little more each day until the corn has replaced the oats. By soaking the corn it seems that much of the difficulty in getting the pigs back on a corn diet is overcome.

While the pigs are on the treatment it is advisable if the owner has some cured alfalfa hay to give the pigs some of this *cured* alfalfa as this will help to keep them satisfied without overtaxing their digestive system.

2. Pinkerton method.

Allow the swine no food or water for several hours. Then give one gallon of water, to which has been added one ounce of sodium bicarbonate, per animal and allow no other drink or food for 12 hours.

Then feed whole oats which has been soaked for 12 hours in a solution made by adding up to 10 pounds (one gallon) of salt to 15 gallons of water. This salted oats is fed for three or four days, stopped for three days, during which the usual ration is supplied, and then repeated. This is the maximum dosage of salt. Lower concentrations are more palatable and more satisfactory except in cases of extreme dehydration.

Regardless of how the salt treatment is administered, an abundant supply of good drinking water *convenient* to the animals is important. Very considerable losses have been experienced where the animals had to walk only 200 feet from where they were fed the salted buttermilk or salted oats, to an abundant supply of fresh water. There have been no reports of injury from the salt where abundant fresh water was available where the animals were fed.

In all cases, all animals in the herd are treated, both the ailing animals, which are not too sick to eat, and those that are apparently well.

A controlled experiment was conducted at the Wisconsin Agricultural Experiment Station in which test pigs, except one group which

functioned as the controls, were fed salted oats in different combinations. After several weeks the controls had gained on the average more than any of the treated groups. This led to the conclusion that the salt treatment is more harmful than beneficial as a remedy for pigs with enteritis. In other words that "the cure was worse than the disease," in the Wisconsin trials.

Improved Dip for Sheep Ticks

An effective, economical, and easily prepared dipping solution for ridding sheep of ticks has been developed in recent research by N. G. Cobbett and C. E. Smith of the Bureau of Animal Industry, veterinarians of the U. S. Department of Agriculture. The dip is prepared merely by mixing six ounces of derris powder containing 5% rotenone with a little water to make a thin paste, and then diluting that in 100 gallons of water. Cubé powder may be used instead of derris, since both contain the same effective, tick-killing substance, rotenone.

Only a limited supply of rotenone is now being imported into the United States. However, control of sheep ticks is one of the uses authorized by War Food Administration for which rotenone may be allocated by the War Production Board. Allocations may be arranged through state livestock sanitary officials.

Dips made with derris or cubé powders are not only easy to prepare, but also save labor, since one dipping is enough. Most other sheep dips require two applications about 24 days apart, the first to kill the adult ticks and the second to kill the new crop of ticks that develop from the pupæ. Rotenone dip kills both the adult ticks and the pupæ in one dipping, and remains effective in the fleece for several weeks.

Another advantage of the method is that unheated water from practically any source can be used. In the experiments the presence of alkali and even enough clay to muddy the water did not reduce its effectiveness. However, clean water is preferable.

When available on the market, derris or cubé powder containing 5% rotenone usually sells for from 40 to 50 cents a pound. On that basis the approximate cost of either of the dips is less than 20 cents per 100 gallons. The experiments showed also that the average sheep carried about three-fifths of a gallon of the dip out of the vat. Therefore, the estimated loss of dip for 100 sheep is 60 gallons, worth about 12 cents.

None of the dipped sheep or their fleeces, suffered any ill effects. The ewes and their lambs claimed each other promptly after the dipping and no matting of wool occurred. Observations of the sheep at periods of about one, two and three months after the dipping showed that all live ticks and practically all the pupæ had been killed.

The WFA goal for spring pigs is 57,500,000, about 11% more than the indicated number. Swine raisers are requested to increase their planned farrowings by this amount.

Alfalfa silage was much improved in a Wisconsin experiment by the addition of 200 pounds of corn and cob meal to the ton of wilted alfalfa as it was ensiled.

Smith, Duke University School of Medicine, fed dogs on diets deficient in various members of the B complex vitamins and produced a progressive ascending paralysis with each of them, which, if not relieved by supplying the deficient vitamin, was rapidly fatal. The incidence of paralysis varied considerably in animals on the different deficient diets. It was greatest on diets deficient in all members of the B complex.

Fur-Seal Carcasses Utilized

An appropriation of $135,000 has been made by Congress to erect an addition to the by-products plant on the Pribilof Islands for the utilization of fur-seal carcasses. Last year 58,000 carcasses were processed from which 750,000 pounds of meal (worth $26,000) and 75,259 gallons of oil valued at $61,000 were produced. With the increased capacity it is expected that the oil production will be greatly increased and that of meal doubled. The fur-seal herd on the Pribilof Islands is now estimated to number 2,500,000 animals.

★★★ BUY WAR BONDS ★★★
AND HOLD THEM

Through experiments it has been demonstrated by the New Jersey agricultural experiment station that if hens are fed sprouted grain (wheat or oats) at the rate of 5 pounds per 100 hens they will secure about one-third of the required vitamin A, which is enough to prevent deficiency. This substitution is suggested where there is a scarcity of feed oils, alfalfa meal and yellow corn. The grain is soaked overnight and then spread one-fourth inch thick over about three sheets of newspaper in large flat trays.

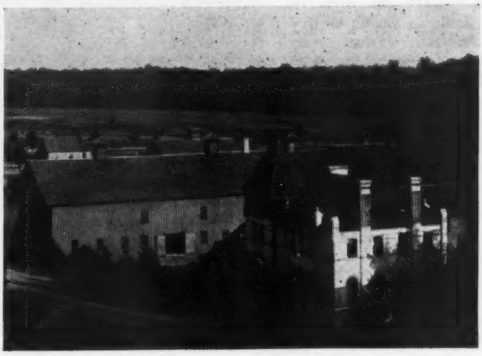
Reminiscences

By NELSON S. MAYO
Mt. Dora, Florida

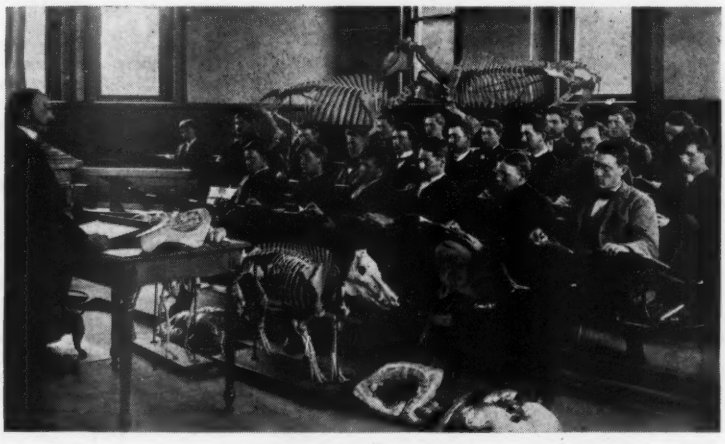
IT HAS been said that when one grows reminiscent it is an indication of advancing years or failing mentality. In the present case it could be both, but as VETERINARY MEDICINE has asked for this it must assume part of the responsibility for any shortcomings.

I went from a farm home, and a country school, to the Michigan Agricultural—now the Michigan State—College. In the senior year Dr. E. A. A. Grange, who was professor of veterinary science, gave a course on that subject. He was later Principal of the Ontario Veterinary College. I became interested in veterinary medicine and decided to enter the profession. After graduating I was considering going to Toronto, but a Michigan veterinarian, who had recently graduated from Toronto, advised me to go west and so I entered the Chicago Veterinary College.

In the fall of '88 the National Cattle Growers' Association was holding a meeting at the Sherman Hotel in Chicago. I went down one evening and met Dr. Paul Paquin, who was State Veterinarian of Missouri, and Doctor Detmers of Ohio State University, who was called "Santa Claus" by the students there. There were too few members of the Association to hold a meeting, so we three adjourned to a basement saloon, where Doctor Detmers drank beer and Doctor Paquin red wine, while they discussed transmissible animal diseases —both men were far in advance of those times and it proved an interesting and profitable evening for me.



The old veterinary building, in foreground, at Michigan State. Built in 1885, it was torn down in 1930



In a classroom of the old veterinary building, Dr. E. A. A. Grange is giving instruction in veterinary medicine. Doctor Grange was Professor of Veterinary Science from 1883-1898. Photo taken in 1893

At this time Dr. Frank Billings (not to be confused with the famous Chicago physician of the same name) was professor of bacteriology at the Chicago Veterinary College. He had been educated in Germany and was engaged in a violent controversy with Dr. D. E. Salmon, then chief of the Bureau of Animal Industry, regarding the causative agent of hog cholera. Billings claimed to have discovered the responsible germ and to have developed an immunizing vaccine. He interested a Chicago man who purchased a considerable number of hogs that Billings vaccinated. The large majority of the hogs died of cholera and so ended the experiment.

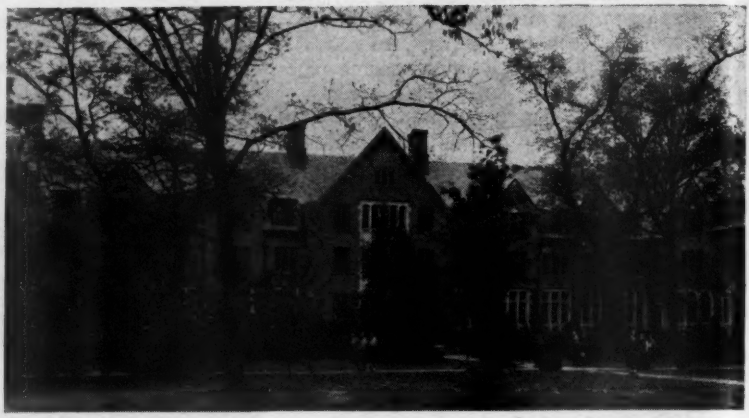
Doctor Billings later was appointed veterinarian at the Nebraska Experiment Station. He was brilliant although erratic, but his scientific work was not dependable, however, he was a prolific writer on animal diseases.

After graduating at Chicago I began practice in a small town in southern Michigan. I

lived at the town's only hotel where a typical, pompous quack doctor blew in one day. He took whole pages of advertising in the local paper—no cure, no pay, "Chronic diseases a specialty," etc. One day he was riding with me and he said, "Doc, come with me. I'll take the human end and you take the horse end and we'll bankrupt Christendom." I did not accept his proposition. Soon afterwards I returned to Michigan State College as assistant to Doctor Grange, in the veterinary department. Before I left, I bet a hat with Pat, the bartender, that "old Doc" would "soak" the hotel. A few weeks later I received a new derby.

Doctor Grange was a fine man to be associated with, but his ideas regarding research were rather unique—he had an idea that heaves in horses could be treated by injecting oxygen gas per rectum. So for weeks I generated oxygen gas and inflated two afflicted "plugs," but they continued to grunt and heave as rigorously as ever. While working as Doctor Granger's assistant, I took advanced work and obtained an M.Sc. degree. I may also add that I married a college classmate and accepted a position as Professor of Veterinary Science in the Kansas State College and Veterinarian in the Kansas Agricultural Experiment Station, and so started out "on my own." The "ups and downs" of which I may tell something later, were about fifty-fifty in this new field of work.

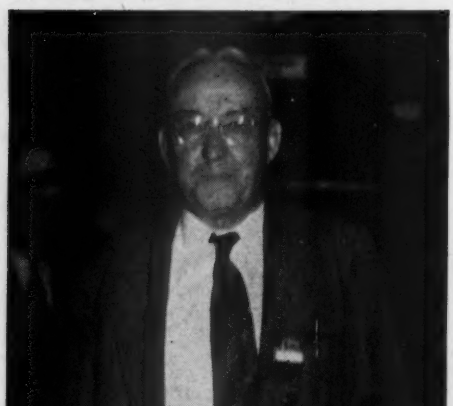
(To be continued)



MARY MAYO HALL

A beautiful, modern dormitory for girls at Michigan State is this building, named to honor Mary Mayo — Doctor Mayo's mother

This and preceding photos, courtesy Department of Publications, Michigan State College.



NELSON S. MAYO

Doctor Mayo was born on a Michigan farm and graduated from the Michigan State College receiving the degrees of B.S. and M.Sc. in agriculture. He was graduated from the Chicago Veterinary College in 1889. His services as a teacher include: One year at Michigan State College, 10 years at Kansas State College, four years at the Connecticut Agricultural College and four years at the Virginia Polytechnic Institute.

Doctor Mayo spent five years in the Republic of Cuba where he was vice director of the agricultural experiment station and chief of the bureau of animal industry and 17 years with the Abbott Laboratories of Chicago, first as head of the Veterinary Department and later in charge of the Export Department.

In veterinary associations Doctor Mayo has been long active in the states in which he has lived and has served the A.V.M.A. as its secretary for six years, 1913-15 and 1918-22 and chairman of its education committee for 12 years, 1932-43. He is the author of a textbook, "Diseases of Animals" and has been a frequent contributor to veterinary and agricultural periodicals over a long period. He has visited most of the important countries of Europe and traveled extensively in Latin America. Retiring a decade ago he has since lived in Highland Park, Ill., but spends the winters in Mount Dora, Florida

A Preliminary Report on Penicillin in the Treatment of Chronic Streptococcic Mastisis*

By C. S. BRYAN,† R. E. HORWOOD§ and C. F. HUFFMAN§

East Lansing, Michigan

THE discovery of penicillin by Fleming[2] in 1929, the success of its therapeutic use in human streptococcic infections since that time, its lack of irritating properties to the human, and the report of Kakavas[3] based on a limited number of cases, that sodium penicillin solution has chemotherapeutic promise in streptococcic and staphylococcic mastitis stimulated this study of the value of penicillin in the treatment of udder infection caused by *Streptococcus agalactiae.*

Penicillin**

Penicillin is an antibiotic agent obtained from cultures of *Penicillium notatum.* The drug was supplied to us as the sodium salt in vials of 50,000 units. In our early experiments 0.9% saline solution was used as the vehicle of administration both for intravenous and mammary infusion, but this was replaced with sterile distilled water when it was found to be equally as satisfactory.

The 50,000 units of penicillin were dissolved in 500ml of the vehicle thereby yielding 100 units per ml of solution. The dosage administered was regulated by the ml of solution administered. Thus to infuse 5,000 units per quarter 50ml of the solution was used and for 10,000 units 100ml was administered. This aqueous solution of penicillin was readily administered with the intravenous outfit and mammary infusion tubes according to the technic previously outlined.[1]

Intravenous Medication

Since the chemotherapeutic agents available for udder infusion result in varying degrees of udder tissue irritation, as demonstrated by a change in the physical appearance of the milk and a decrease in milk production and, since udder infusion is a surgical technic which frequently is not conducted in an aseptic manner, the results of udder infusions are often entirely unsatisfactory to both the veterinarian and the dairyman. To overcome these hazards research workers are attempting to find an agent that will be effective in streptococcic mastitis when administered intravenously.

One cow with chronic *Str. agalactiae* udder infection was selected for intravenous treatment. The penicillin was given to the cow at three-hour intervals, since previous reports[4] have demonstrated that in humans practically all of the penicillin is eliminated within three hours after intravenous administration. The size of the dose of penicillin for the cow is unknown, therefore a trial dose of 50,000 units was administered intravenously every three hours until four treatments or a total of 200,000 units had been administered. No change was noted either in the physical condition of the cow or in the bacteriological examination of milk samples collected from this cow; the udder infection persisted. A temporary slight rise in temperature to 103.4° F. was obtained above the normal of 101° F. for this cow. The temperature began to increase at the time of the third injection (six hours after the first), reached its high point when the fourth injection was made (nine hours after the first), and then receded to normal within an additional four hours.

One week later this same infected cow received 100,000 units of penicillin intravenously every three hours until a total of four injections or 400,000 units had been given. Again no change in the physical condition of the cow or state of udder infection was noted. The temperature increased from the 101° F., normal, to 103° F. by the time of the third injection (six hours after the first of the series) and was down to 102° F. at the time of the fourth injection and normal two hours later. These results indicate that no ill effects are obtained from the intravenous use of penicillin in cows in this dosage.

Realizing that the treatment would be prohibitive in cost for general practice, even if recovery had been obtained, both from the standpoint of the large amount of penicillin that might have to be used intravenously and from the number of times the penicillin was administered, our efforts were directed to a study of udder infusions with penicillin.

Irritating Properties of Penicillin When Used as an Agent for Udder Infusion

In all udder infusions it is highly desirable that the drug used does not possess marked irritation properties to the udder tissue. This

*Journal Article No. 741 (n.s.).

**The penicillin (sodium salt) was furnished through the courtesy of Parke, Davis and Co., Detroit 32, Mich.

†Department of Surgery and Medicine, Michigan State College.

§Department of Dairy, Michigan State College.

is especially true in the treatment of lactating cows, as irritation of the mammary tissue results in the secretion of abnormal milk and a decreased quantity of milk for varying periods of time following treatment.

To determine the reaction of the udder to penicillin the right rear, right front, left front and left rear quarters of two cows with *Str. agalactiae* mastitis infection were simultaneously infused with 1,000, 5,000, 10,000, and 20,000 units, respectively, of penicillin in sterile physiological saline solution in the one case and in sterile distilled water on the second case. No swelling or drop in milk production resulted, but both cows produced "flakey" milk for two days, followed by flakes in the first drawn milk for three additional days. The cows experienced a 30% drop in milk production for one day only, and the normal milk flow was regained on the fourth day. In all cases the udder was milked out at the next regular milking. These data indicate that penicillin is relatively nonirritating to udder tissue; even when large amounts are administered by udder infusion.

Results and Discussion

The cows treated with penicillin were found to have *Str. agalactiae* infection of the udder upon bacteriological check-up and were free from marked indurative changes of the udder,

TABLE I.—THE DAILY PRODUCTION OF COWS THAT HAVE RECOVERED FROM *Streptococcus agalactiae* MASTITIS FOLLOWING UDDER INFUSION TREATMENT WITH PENICILLIN

Days Before Treatment	The Pounds of Milk Produced Per Cow per Day by Cows as Numbered											
	288	405	F	S 3rd	M 2nd	285	A37	S	I	408	A40	P 2nd
7	40.8	36.8	25.8	23.7	16.3	18.2	17.3	14.0	10.4	6.2	6.8	3.7
6	40.8	39.2	23.5	22.8	15.3	18.9	17.5	13.0	9.5	9.0	6.9	2.9
5	40.6	39.2	24.8	21.6	16.9	21.0	17.9	13.6	10.3	9.2	6.6	3.4
4	44.8	34.6	22.5	22.7	16.1	16.7	17.8	13.7	11.0	9.4	7.7	3.2
3	43.1	41.4	24.0	22.0	13.6	18.0	16.9	13.2	9.7	9.1	6.0	3.5
2	41.2	49.9	23.5	27.3	15.0	18.0	15.1	13.0	11.7	9.6	5.6	2.5
1	44.3	45.0	24.4	21.9	15.3	18.1	16.1	13.4	10.7	10.6	5.3	3.2
Days After Treatment	Units of Penicillin into Each Quarter											
	5000	5000	10000	10000	10000	5000	5000	10000	10000	5000	5000	10000
1	31.9	28.8	19.7	18.4	10.7	16.6	14.1	10.2	8.4	8.6	4.3	0.8
2	37.5	26.8[a]	19.9	19.6	11.4	16.3	15.9	11.8	10.5	6.9[e]	4.3	1.3
3	40.6	31.8	21.0	24.1	14.9	17.9	16.1	10.5	9.7	9.5	4.8	1.6
4	41.0	47.6	20.9	24.6	14.3	18.9	17.5	12.9	10.5	6.9	5.8	1.5
5	42.1	37.4	21.2	24.1	13.0	17.3	16.7	10.9	10.2	7.5	5.1	1.9
6	43.6	40.9	21.8	24.8	14.8	19.3[b]	17.5	12.7	11.5	8.1	5.2[f]	1.5
7	42.5	36.4	22.9	24.4	15.5	13.5	20.8	12.5[c]	12.5[c]	6.9	4.5[f]	1.6
8	42.6	37.8	19.6	24.5	17.7	16.5	18.7	9.1	9.5	8.1	4.6	1.6
9	43.5	38.8	18.8	25.4	15.4	16.3	18.2	9.3	11.4	8.5[e]	4.8	1.6
10	40.5	38.3	21.8	25.5	16.3	17.8	16.0	11.2	11.4[d]	8.2	4.0	1.7

[a] L. F. and [b] R. F. were still infected so were each given a second injection of 5,000 units into the quarters.
[c] Still infected so all four quarters were injected a second time with 10,000 units per quarter.
[d] Still infected so all four quarters were injected a third time with 10,000 units per quarter. Milk production continued in same trend without marked change.
[e] The R. R. quarter of this cow was producing "gargety" milk prior to treatment and continued to do so for 20 days following the first treatment and elimination of infection from her udder, so determined by bacteriological tests applied to the milk. Additional infusions of 5,000 units of penicillin each were made into this quarter 2 and 9 days after the first infusion with no material change in the milk production.
[f] Some bloody milk was obtained from this cow.

for one milking after the treatment followed by the presence of a few flakes in the first drawn milk at milking time for two additional days. At no time was the milk abnormal except for the presence of flakes as indicated. The milk production of both cows dropped 20% for two days only. All quarters of both cows became free of the infection with the one treatment only.

Although free from udder infection, one month later, these same two cows were given infusions of 50,000, 100,000, 200,000 and 400,000 units of penicillin in sterile distilled water into their R.R., R.F., L.F. and L.R. quarters, respectively. As before very little reaction was obtained. The only changes noted were flakes in the milk of each quarter of both cows for as determined by a careful physical examination. Six cows (288, 405, 285, A37, 408 and A40) were treated with 5,000 units and six more (F. S3rd, M2nd, S, I, and P2nd) received 10,000 units of penicillin per quarter; see Table I.

Of the cows receiving 5,000 units per quarter, four (288, A37, 408, and A40) became free from the infection with one treatment and two cows (405 and 285) required two treatments. The R.R. quarter of cow 408 was producing "gargety" milk prior to treatment and continued to do so for 20 days following the first treatment and elimination of the infection from her udder. Two additional injections of 5,000 units each were administered to the R.R. quarter in the absence of infection with

the hope of an early disappearance of the "gargety" milk. Marked improvement resulted after each injection.

Four (F, S3rd, M2nd, and P2nd) of the six cows treated with 10,000 units of penicillin per quarter recovered after one udder infusion, one cow required two infusions, and one had to be treated three times to effect recovery. Since the milk is not grossly abnormal it can be examined for bacteria the day following treatment thus making it unnecessary to prolong the period of treatment if several injections are necessary to yield recoveries.

The daily milk production of these 12 cows for seven days prior to treatment and for 10 days after treatment is presented in Table I. Although the cows were in all stages of lactation, with approximately 42 pounds of milk daily for 288, as the high cow, on down to approximately three pounds for P2nd, as the cow giving the least amount of milk at the time of treatment, the milk production following treatment either was not reduced at all or only slightly for a short period. Cow 288, which was at the height of her lactation period, experienced a 24% drop in milk flow the first day but only a 10% drop the second day after treatment and was back to normal milk flow on the third day. Thus penicillin proves to be the least irritating to the mammary tissue of any udder infusion agent thus far studied.

The leucocyte counts, chloride determinations and pH readings of milk produced by the cows after treatment all indicate that even penicillin is mildly irritating to the udder tissue but the milk returned to normal within seven days in all cases insofar as these indirect mastitis tests are concerned.

An additional 10 cows with chronic *Str. agalactiae* mastitis were treated with 10,000 units of penicillin per quarter but careful records of milk production for these cows were not available; eight of these recovered with one treatment while the remaining two required two treatments to effect recovery.

The exact dosage of penicillin necessary to yield the greatest number of recoveries with the fewest treatments has not yet been established, so eight cows were treated with 12,500 units per quarter. One of these cows required three treatments, and one had to have two treatments, while the remaining six needed but one treatment to destroy the streptococcus infection in the udder.

Although favorable results were obtained in each case treated thus far no one should interpret this to mean that *all* cows with *Str. agalactiae* udder infection will recover upon treatment.

Summary

The intravenous administration of 50,000 units of penicillin at three-hour intervals until 200,000 units were given was ineffective in the treatment of chronic *Str. agalactiae* mastitis infection. The results were similar when 100,000 units were given intravenously every three hours, aggregating a total of 400,000 units. In each case the only change noted was a 2° F. increase in temperature; this became normal four hours after the last injection.

The infusion of 1,000, 5,000, 10,000, 12,500, 20,000, 50,000, 100,000, 200,000 or 400,000 units of penicillin (sodium salt) per quarter proved relatively non-irritating to mammary tissue since only mild reductions of milk production and a few flakes were noted in the milk of cows so treated, even though some cows were producing 42 pounds of milk per day. The results of the indirect mastitis tests, such as leucocyte counts, chloride determination, and pH of the milk produced after treatment, confirm the clinical evidence that penicillin is only mildly irritant to the udder.

The individual quarters of two cows with chronic streptococcic mastitis receiving 1,000, 5,000, 10,000 and 20,000 units respectively recovered with one treatment.

Of six cows with chronic *Str. agalactiae* mastitis whose udders were infused with 5,000 units of penicillin per quarter, four recovered as a result of one treatment; the remaining two needed two treatments.

Sixteen infected cows were treated by infusing 10,000 units of penicillin per quarter. Twelve of these recovered with one treatment, three cows with two treatments, and one cow required three treatments to effect recovery.

Eight infected cows received 12,500 units of penicillin per quarter; six recovered from one infusion, two after two infusions and the third required three infusions.

Three dosages of penicillin were used per quarter in the 32 cows reported. All of these cows, treated thus far, have become free from the chronic streptococcic mastitis.

No cow with marked indurations of the udder was treated.

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The Gastrointestinal Parasites of Sheep in North Dakota*

By D. F. EVELETH† and ALICE I. GOLDSBY†

Fargo, North Dakota

DURING the past 10 to 15 years there has been a progressive decline in the quality of the lambs marketed from the northern plains states. The poorer quality of the sheep has generally been ascribed to malnutrition and to parasitism. Since 1940 there has been an abundance of rainfall with large amounts of summer and winter feed, however, there has been an increasing complexity in the problems arising from gastrointestinal parasites.

This report summarizes the results of surveys made on the parasite load of sheep and lambs from North Dakota and western Minnesota and compares various methods of control measures that have been used in attempting to decrease the losses resulting from parasitism.

The continuous feeding of phenothiazine and salt as an anthelmintic for sheep has some very definite advantages over the older drugs which were used intermittently but there are still numerous problems which have arisen in sheep parasite control work that have not been answered by experiments recorded up to the present time.

Experience with farm and semi-range flocks has indicated that the use of the phenothiazine-salt mixture is of definite benefit in keeping the infestation low, provided there is never an excessive number of parasites at one time. Our conclusions agree very well with those of Peterson, Kammlade and Webb[1].

It has been observed in several flocks that, even on a program of continuous feeding of salt and phenothiazine, many of the animals show evidence of parasitism. Similar observations made in other flocks had previously indicated the need of an anthelmintic that would remove most of the parasites from the ewes during the winter or spring so as to prevent heavy infestation of the lambs during the early summer.

In a recent publication, Britton and Miller[2] have listed the four requisites of an ideal anthelmintic as, nontoxic to the host, ease of administration, low cost and effectiveness. In the Northern Plains States the five drug combinations most frequently used to combat gastrointestinal parasites of sheep are (1) phenothiazine, (2) copper sulphate-nicotine sulphate, (3) tetrachlorethylene, (4) a mixture of kamala, copper sulphate and nicotine sulphate and (5) arsenous acid with copper sulphate. Since death losses usually increased following their use, all of these drugs, except phenothiazine, have been criticized by the sheepmen because of their toxicity. The high initial cost as well as its failure to control Ostertagia, some intestinal roundworms and tapeworms, has prevented the phenothiazine drench from becoming popular.

Investigation, started in this laboratory during the winter of 1943-44, showed that phenothiazine at the dosage of 1gm per lamb per day, when fed with hay or grain does not always decrease the ova count for Trichostrongylus and Nematodirus. When these lambs were examined post mortem, they were found to harbor Haemonchus, Ostertagia, and both broad and fringed tapeworms as well as the intestinal roundworms.

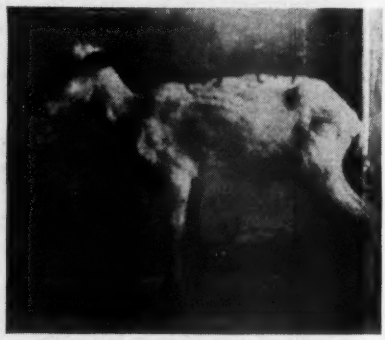

Fig. 1. Practically pure infection of trichostrongyles found upon autopsy

During the early spring of 1944 various types of anthelmintics were tried on individuals and flocks in order to determine a combination of parasiticides that would remove the largest numbers of both roundworms and tapeworms. Repeated trials indicated that none of the standard anthelmintics would remove the majority of the parasites unless excessive dosages were used. Various combinations were then tried, under laboratory conditions, in order to find a relatively nontoxic combination of an-

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†Department of Veterinary Science, North Dakota Agricultural Experiment Station.

thelmintic drugs which could be used safely under farm and range conditions.

The types of parasites involved were ascertained by post-mortem examination of sheep obtained from western Minnesota and points over the state of North Dakota. Table I shows the types of parasites found in the post-mortem examination of 94 sheep and lambs.

TABLE I.—INCIDENCE OF VARIOUS TYPES OF PARASITES IN NORTH DAKOTA SHEEP

Genera Found on Autopsy	No. of Sheep
Ostertagia circumcincta	57
Haemonchus contortus	50
Trichostrongylus sp.	59
Nematodirus sp.	56
Thysanosoma actinoides	9
Moniezia sp.	32
Chabertia ovina	24
Cooperia sp.	9
Oesophagostomum columbianium	13
Strongyloides papillosus	18
Bunostomum trigonocephalum	5
Trichuris ovis	14

The effectiveness of an anthelmintic depends to a large extent on both the constituent drugs and the method of administration. The limitations of most drugs and drug combinations are well recognized. This report discusses the results obtained with a combination of drugs which, in our experience, has been of high parasiticidal value. This alkaline anthelmintic mixture, when administered in such a manner that most of the dose goes into the rumen, is relatively nontoxic to sheep but highly effective in removing most gastrointestinal parasites.

Tests were conducted with the Whitlock nozzle attached to a Shikles syringe as described previously[3]. Whenever a dyed solution was administered with this apparatus and the sheep killed within four hours, the greater portion of the stained material was found in the rumen. It was also ascertained in these experiments, that large doses of the alkaline anthelmintic mixture can be administered without causing distress to the sheep.

The parasites which in our opinion were responsible for the principal losses which the sheepmen were experiencing were *Haemonchus contortus*, Ostertagia sp., Trichostronglyus sp. and possibly Nematodirus sp. and Moniezia sp. It was determined that none of the standard anthelmintics are completely effective in removing all of these parasites from infested sheep, however, when combinations were tried in alkaline solutions, it was observed that the parasiticidal action is usually increased.

Various combinations were tried until a mixture of anthelmintics was found that was quite lethal for the five parasites listed previously, and, also, were relatively nontoxic to sheep.

The alkaline mixture* is made according to the following formula:

TABLE II.—ALKALINE ANTHELMINTIC MIXTURE

	Parts by Weight
Copper sulfate $CuSO_4 5H_2O$	54
Sodium arsenate $Na_2HAsO_4 7H_2O$	26
Ammonium carbonate $(NH_4)_2CO_3$	20
Sodium bicarbonate $NaHCO_3$	675
Phenothiazine NF	450
Gelatin (ground)	15
Nicotine sulfate 40% solution	20

Two methods of administration proved quite effective in removing the parasites, the method of choice depending on the individual and the manner of feeding the sheep.

Mixing the alkaline anthelmintic with grain saves considerable labor and is satisfactory for

Fig. 2. Typical appearance of a lamb heavily infested with intestinal parasites

sheep that are being grain fed. One and one-half ounces of the dry powder per ewe, or one-half to three-fourths of an ounce per lamb, is mixed with a single feeding of grain slightly moistened with water. It has been observed that most sheep will eat the mixture readily. It is advisable to repeat treatment in one week.

For preparing the drench, two pounds 14 ounces of the dry powder is mixed with sufficient water to make one gallon. The dose when administered with a stomach tube or Whitlock nozzle is 1cc per pound of sheep.

When the drench is given by means of a tube in the mouth, with a drenching bottle or with a short dosing nozzle, the dose should be about one-fifth less, since most of the drug

*The phenothiazine used in these experiments was in part contributed by the DuPont de Nemours Co. of Wilmington, Del.

goes directly into the abomasum and there may be absorbed rapidly.

During the summer and fall of 1944 over 2,500 sheep were given this anthelmintic with deaths occurring in only four lambs. In these four cases, the animals were unable to stand when treated, because of weakness due to heavy parasitism and anorexia. Experiments conducted in the laboratory indicate that a prolonged fast was of no advantage before dosing the sheep. Further work on this point is necessary in the matter of treatment against the fringed tapeworm located in the bile ducts.

The advantages of the combination of drugs in an alkaline mixture, appears to be largely in the ability of this mixture to dissolve the mucus on the surface of the gastrointestinal tract. As soon as the anthelmintic mixture reaches the abomasum, it dissolves the mucus and exposes the parasites to the action of the drugs. In this way immature as well as the mature forms of Haemonchus, Ostertagia, and Trichostrongylus, which are ordinarily imbedded in the gastric mucus, are readily killed. The suspension of sodium bicarbonate and the dissolved ammonium and sodium salts make a permanent buffer mixture that remains alkaline in spite of dilution with stomach contents and dissolves mucus in the anterior portion of the small intestine. This enables the material to contact the Nematodirus and the tapeworms as well as the trichostrongyles located in this area. The alkaline solution containing ammonia forms a stable copper complex which in the presence of the extra base does not change readily. This copper-ammonia complex is highly parasiticidal. The nicotine and arsenate appear to be as effective in alkaline as in neutral or acid solution.

The phenothiazine is not altered by the alkaline salts and is thus able to exert its action on the roundworms found in the small and large intestines. Hookworms, nodular worms and large mouth bowel worms are usually eliminated although the dose of phenothiazine is smaller than the amount generally recommended.

A few selected individual cases are used to show the comparative parasiticidal action of certain drugs and drug combinations as well as to illustrate certain husbandry practices which contribute to the effectiveness or ineffectiveness of any system of parasite control.

Case 1.—A 1944, spring lamb. It was penned in a barn lot with moderately heavily parasitized ewes and with the remainder of the flock was handled as follows:

6/9/44: The ewes given 25gm phenothiazine as a commercial drench. No lambs were treated.

6/9/44: All the sheep and lambs given phenothiazine and salt 1:9 free choice.

7/25/44: The lambs and ewes were dosed with an alkaline, cathartic vermifuge. The lambs were given 40cc of the following mixture:

Copper sulfate	53.5gm
Nicotine sulfate (40%)	30.0gm
Sodium bicarbonate	337.5gm
Sodium sulphate	225.0gm
Arsenic pentoxide	10.0gm
Ammonium hydroxide (26% NH_3)	90.0cc
Water	To make one gallon

9/5/44: One lamb (designated Case 1) died from an abscess of the jaw.

The following internal parasites were found at necropsy.

Haemonchus contortus	62
Ostertagia sp.	218
Immature nematodes	80
Trichostrongylus sp.	764
Strongyloides papillosus	104
Moniezia sp.	15gm

Case 1 illustrates the value of treatment of the ewes prior to the feeding of phenothiazine and salt. The alkaline cathartic appears to have been in part responsible for the relatively low parasite load found at the post-mortem examination. It has been found that even in September, when this lamb died, the full load of Trichostrongylus and Nematodirus had not been reached in most flocks.

Case 2.—A 1944, spring lamb with a history of heavy parasitism in the flock, which had been fed phenothiazine and salt continuously since the fall of 1943.

8/1/44: Given 12.5gm of phenothiazine as a tablet by owner.

8/7/44: Received at laboratory and placed on heavily contaminated pasture.

8/28/44: The differential count of ova per gram of feces was:

Haemonchus	2120
Ostertagia	1920
Strongyloides	1660
Trichostrongylus	1060
Nematodirus	60

9/5/44: Killed in moribund condition. The count of gastrointestinal parasites on necropsy was:

Haemonchus contortus	1440
Ostertagia sp.	3680
Immature nematodes in abomasum	4160
Trichostrongylus sp.	4570
Nematodirus sp.	2560
Strongyloides papillosus	570
Immature nematodes in small intestines	3480
Trichuris ovis	1
Chabertia ovina	7

Case 2, in which the lamb had access to phenothiazine and salt and, later, was given a phenothiazine tablet after which it was placed on a heavily contaminated pasture, illustrates the fallacy of depending on a single treatment before lambs are placed on contaminated pastures. By comparison with Case 1, the value of repeated anthelmintic treatment is strikingly shown.

Case 3.—A 1944, spring lamb; kept on contaminated pasture with continuous feeding of phenothiazine and salt. Of 300 lambs in the flock 60 had been lost.

8/26/44, dead lamb submitted for examination. A count of parasites at necropsy revealed:

Haemonchus contortus	4560
Ostertagia sp.	1440
Trichostrongylus sp.	560
Nematodirus sp.	1520
Bunostomum sp.	80
Moniezia sp.	68gm
Chabertia ovina	10

Case 3 illustrates the danger of depending entirely on phenothiazine and salt when sheep and lambs are on heavily contaminated pastures.

Case 4.—A 1943, spring lamb, which had been kept in a barn having a concrete floor which was cleaned at weekly intervals.

12/7/44: Ova per gram of feces, 1000.

12/8/44: Started on one gram of phenothiazine on hay per day.

3/20/44: Ova per gram of feces, 200.

3/24/44: Given a 10-gram capsule of phenothiazine and continued with one gram per day on the feed.

3/27/44: Ova per gram of feces, 620.

4/17/44: Given eight grams of phenothiazine and one gram of lead arsenate. The one gram of phenothiazine per day on the feed was continued.

Ova per gram of feces on this date, 520.

5/1/44: Ova per gram of feces, 200.

5/13/44: Dosed with 60cc of 1%, copper sulfate solution and 1%, nicotine mixture.

Ova per gram of feces on this date, 1000.

5/22/44: Lamb sacrificed. Necropsy record:

Ostertagia sp.	2800
Haemonchus contortus	25
Trichostrongylus sp.	5650

Case 4 was one of a group of experimental lambs kept at the laboratory. These lambs were penned in box stalls with concrete floors. The stalls were cleaned often and it is doubtful if there was much chance for reinfestation. The continuous feeding of phenothiazine definitely decreased the ova production of the parasites, but as shown in the necropsy record, neither the phenothiazine, lead arsenate, nor the standard cunic* mixture eliminated the Trichostrongylus, Ostertagia or Haemonchus.

Case 5.—A 1943, spring lamb; housed in a barn on concrete floor, which was cleaned at weekly intervals.

12/7/43: Ova per gram of feces, 1600.

12/8/43: Started on one gram powdered phenothiazine on the hay per day.

1/31/44: Ova per gram of feces, 740.

2/4/44: The daily administration of phenothiazine on the feed discontinued.

3/20/44: Ova per gram of feces, 140.

3/24/44: Dosed with a 10-gram capsule of phenothiazine, followed by one gram on feed per day.

4/10/44: Ova per gram of feces, 0.

4/17/44: Administered eight grams of phenothiazine and one gram of lead arsenate. One gram per day of phenothiazine continued.

Ova per gram of feces on this date, 600 tapeworm ova.

*Copper sulfate-nicotine sulfate mixture.

5/13/44: Dosed with 50 grams phenothiazine drench.

Ova per gram of feces, 0.

5/18/44: Placed on pasture where contaminated sheep had been all winter. Access to a shed for shelter.

Ova per gram of feces on this date, 0.

7/21/44: Dosed with capsule containing 1cc nicotine sulfate (40%), 1gm picric acid, 1gm copper sulfate formed in ammonium complex and 40mg arsenic pentoxide.

Ova per gram of feces, this date:

Trichostrongylus	320
Haemonchus	1500
Ostertagia	600

7/26/44: Differential count of ova per gram of feces:

Haemonchus	200
Ostertagia	460
Trichostrongylus	200

9/6/44: Starved 24 hours before feeding. Six animals—three lambs, two yearlings and one ewe, were fed 170 grams of alkaline mixture (Table II) in six pounds of oats.

Ova per gram of feces, this date:

Trichostrongylus	120
Ostertagia	120
Haemonchus	720

9/12/44: Sacrificed and necropsy held. Parasite count:

Trichuris ovis	3
Trichostrongylus sp.	400

Ova per gram of feces at this time, 0.

Cases 5 and 6 may be considered together. These lambs had been prepared by repeated treatments to be considered as parasite-free lambs. Results from other sheep and lambs have indicated that following repeated treatment, the ova count may be zero while the sheep still harbor large numbers of parasites. These lambs were inadvertently exposed by being placed in a contaminated corral, so that use of them for winter survival study of parasites on the pasture was not possible. The two sheep were fed the alkaline anthelmintic in the grain with very good results in Case 5 while in Case 6 there were some Nematodirus and Trichostrongylus found at the necropsy.

Case 6.—A 1943, spring lamb, which was kept in barn on concrete floor during winter.

3/20/44: Ova per gram of feces, 660.

3/24/44: Given a 10-gram capsule of phenothiazine and started with one gram on feed per day.

4/10/44: Ova per gram of feces, 140.

4/17/44: Fed eight grams of phenothiazine and one gram of lead arsenate.

The one-gram dosage of phenothiazine per day on feed continued.

5/11/44: Ova per gram of feces, 0.

5/13/44: Dosed with 60cc of 1%, copper sulfate solution and 1%, nicotine mixture.

5/18/44: Put on pasture where contaminated sheep had been all winter. Had access to a shed for shelter. One gram of phenothiazine daily on the feed discontinued.

5/21/44: Placed on pasture that had not been occupied during winter. No shelter provided.

7/26/44: Treated with 120cc of same solution

given Case 1 on 7/25/44. Three days later tapeworm segments were found in feces.

9/5/44: Starved 24 hours then treated as was Case 5 on 7/21/44.

9/12/44: Sacrificed. Autopsy record:

Nematodirus sp.	560
Trichostrongylus sp.	1680
Fringed tapeworms (two in cecum)	7
Trichuris ovis	1
Chabertia ovina	7

Differential count of ova per gram of feces:

Ostertagia	60
Strongyloides	260

There are two points to consider here, however, that were not duly appreciated at the time. Case 6 lamb may not have eaten its full share of the grain-anthelmintic mixture and it has also been observed that Trichostrongylus, Cooperia, and Nematodirus may not be eliminated as rapidly as are the less resistant genera, although they are eliminated in two or three weeks after dosing.

Case 7.—A two-year-old ram; received 10/26/44 because of poor condition. He had had phenothiazine and salt continuously for over a year and had been dosed with 25 grams phenothiazine two weeks previously.

Differential count of ova per gram of feces: Trichostrongylus, 320.

10/30/44: Sacrificed. Necropsy record:

Haemonchus contortus	160
Trichostrongylus sp.	18400
Ostertagia sp.	2862
Trichuris ovis	6
Moniezia sp. and Thysanosoma actinoides	36gm

Case 7 illustrates the failure of intermittent dosing with phenothiazine and continuous feeding of phenothiazine and salt in controlling the small gastrointestinal roundworms.

Case 8.—A 1944, spring lamb. This lamb was placed with same flock as Case 1 and received continuous feeding of 1:9 phenothiazine-salt mixture.

7/25/44: Dosed with 40cc of same mixture used in Case 1 on this date and left with flock on a contaminated pasture.

8/31/44: Differential count of ova per gram of feces:

Trichostrongylus	800
Ostertagia	1000
Strongyloides	6200

9/2/44: Dosed with 80cc of anthelmintic mixture (Table II).

9/5/44: Sacrificed. Autopsy record:

Nematodirus sp.	5
Trichuris ovis	1

Case 8 again shows the failure of phenothiazine and salt to protect lambs from parasites on heavily contaminated pastures. The effects of the dosing 7/25/44 need not be considered in judging the efficacy of the treatment 9/2/44 because the ova count was sufficiently high at the latter date to indicate a rather heavy infestation. The results from the dosing showed that in this case there was practically 100% removal of the parasites.

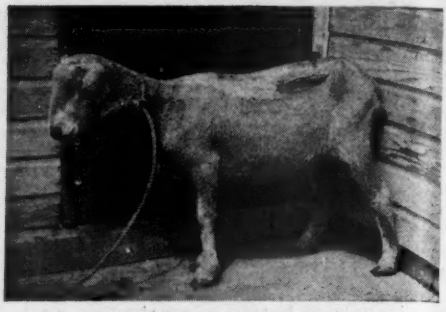


Fig. 3. Non-winter treated ewe heavily infested with stomach and intestinal parasites

Case 9.—A 1944, spring lamb. Purchased on the open market. Showed clinical evidence of parasitism.

10/27/44: Differential count of ova per gram of feces:

Trichostrongylus	660
Ostertagia	860
Haemonchus	320
Strongyloides	800

Given 80cc of alkaline anthelmintic (Table II).

11/4/44: Differential count of ova per gram of feces:

Ostertagia	120
Trichostrongylus	520
Strongyloides	660

Necropsy record:

Ostertagia sp.	8
Nematodirus sp.	40
Trichostrongylus sp.	840

Case 10.—A 1944, spring lamb from the same group as Case 9.

10/27/44: Differential count of ova per gram of feces:

Ostertagia	520
Haemonchus	2060
Nemotodirus	200
Trichostrongylus	320

Given 80cc of alkaline anthelmintic (Table II).

11/4/44: Differential count of ova per gram of feces:

Ostertagia	200
Trichostrongylus	400
Nematodirus	400
Strongyloides	200

Necropsy record of internal parasites:

Ostertagia sp.	40
Trichostrongylus sp.	640
Nematodirus sp.	9600

In Case 9 the parasites were largely expelled by the alkaline anthelmintic while in Case 10 the Nematodirus were not effectively removed. There is no way of estimating the number of Nematodirus in the living animal because in many cases the feces do not contain ova of these parasites when they are present in very large numbers. It has been our observation that the stomach worms are often killed very quickly by the alkaline anthelmintic while the Nematodirus and Trichostrongylus are gradually eliminated either by a delayed action of the anthelmintic or by the response of the

sheep to improved nutrition resulting from the elimination of the other parasites. This lamb was found to harbor the largest number of parasites of any sheep that had been treated with the alkaline anthelmintic and later examined post mortem.

Discussion

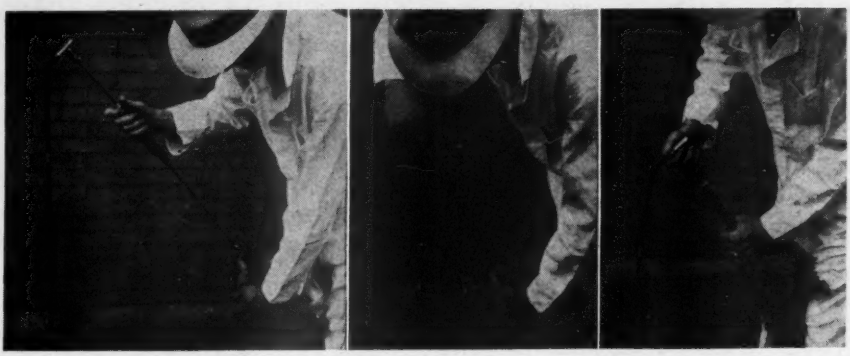
Both Marsh[4] and Swales[5] have found that during the fall and winter the most numerous gastrointestinal parasites in sheep in the north central portion of North America are members of the three genera Ostertagia, Trichostrongylus, and Nematodirus. Griffiths[6] has reported that under Canadian conditions these parasites are capable of surviving the winter on the pastures. Hawkins and associates[7] have reported a decrease in parasites during the winter in ewes receiving no anthelmintic treatment. These conclusions were based on ova counts. Later these authors[8] reported on the effects of various treatments on the parasite load of ewes basing their conclusions on ova counts.

It has been observed that although the ova count gradually decreases during the winter the sheep may still harbor a significant number of parasites.

The problem of sheep parasite control has become very confusing to veterinarians and sheepmen alike. The differences in the recommendations made by various parasitologists have in many cases led the sheepmen to lose faith in any system of parasite control. In the Northern Plains area many of the sheepmen have discontinued the use of phenothiazine and salt because of the failure of this material to control the Ostertagia, Nematodirus and Trichostrongylus. Swales[10] found that phenothiazine as a spring treatment of the ewes markedly lowered the stomach worm load of the lambs the following summer, but did not decrease the number of intestinal trichostrongyles.

The cases reported here, as well as numerous other data, show clearly that the alkaline anthelmintic is practically 100% effective against the stomach worms Haemonchus and Ostertagia. This effectiveness does not seem to be affected by the presence of feed in the rumen or abomasum. This seems of particular importance since in early summer it appears that the greatest damage is done by the stomach worms. The advantages of administering the anthelmintic to sheep without a preliminary fast is at once apparent.

When tapeworms also are present in the intestines our observations have been that both broad and fringed tapeworms are killed by the anthelmintic mixture. We do not have sufficient data on fringed tapeworms, located in the liver, to warrant a conclusion on the efficacy of the alkaline anthelmintic against this type of parasitism.



Method of administration of anthelmintic solution using a Whitlock nozzle attached to a Shikles syringe

Because of the deleterious effects of the trichostrongyles, late summer and fall treatments are advised both for breeding flocks and fattening lambs originating in this area. Some of our experimental lambs have been housed on concrete for as much as three months and fed a ration of alfalfa hay and grain without gain in weight. When these lambs were examined post mortem the predominating parasites were trichostrongyles. Many of these lambs have relatively low fecal ova counts and when examined post mortem the parasites are so small that they are frequently overlooked unless special precautions are taken in examining the contents of the small intestines.

There are several points illustrated in the case reports which are difficult to explain. In Case 1 it is shown that the ova count per gram of feces decreased greatly from small,

but continued, doses of phenothiazine. This observation appears to be significant in interpreting the value of anthelmintics when the criterion of evaluation is based on the fecal ova count. The conclusion seems justified, that phenothiazine may inhibit ova production without killing the parasites. Whether these parasites would later produce viable ova was not determined in this case but other evidence does indicate that even though parasites may cease to produce ova following the administration of phenothiazine these same parasites will later start to produce viable ova after the phenothiazine feeding is stopped.

The problem of reinfestation of sheep has been overlooked by many veterinarians in advising a system of parasite control. This is well illustrated in Case 2. In several instances it has been shown that use of anthelmintics has produced only a temporary improvement in the condition of the flocks so treated. As a routine procedure it seems advisable to treat at intervals of three weeks until the large mass of parasites are eliminated and to supply the phenothiazine-salt mixture continuously.

Preliminary experiments have confirmed the findings of Shorb and Habermann[9] who demonstrated that phenothiazine inhibit the development of certain types of worm ova. In our experiments conducted on continuous feeding of phenothiazine, the only ova which produced viable larvae were the trichostrongyles and the strongyloides. If these indications are proved correct over long time experiments, it appears logical to assume that the continuous use of phenothiazine, in conjunction with periodic drenching with an effective anthelmintic will, eventually, eliminate most of the helminth parasites of sheep.

In no instance has a flock been observed in which an infestation of tapeworms alone was found. Some flocks have a high incidence of either the broad (Moniezia) or the fringed (Thysanosoma) tapeworms, but they have always been infested with both stomach and intestinal roundworms also. As a part of studies of the pathogenicity of Moniezia, a measurement of infestation has been used as the grams of tapeworms recovered, divided by the weight of the sheep in pounds. The value, grams per pound, seems a logical expression of tapeworm infestation, since it is often very difficult to determine the number of tapeworms in heavy infestations.

The pathogenicity of Moniezia has not been established, however, in certain post-mortem examinations the volume of tapeworms was so great that it was impossible to force the contents through the intestine. The weight of worms often exceeds five grams per pound of body weight. The mechanical obstruction to the movement of the intestinal contents may be of significance in determining the effects of these parasites. The probability of a definite toxin from tapeworms is worthy of future research. In several cases of heavy Moniezia infestation the administration of the alkaline anthelmintic resulted in prompt expulsion of a large number of segments in the feces.

Summary

1. A survey of the types of gastrointestinal parasites of North Dakota sheep has been made. The majority of the animals harbored *Haemonchus contortus*, Osteragia sp., Trichostrongylus sp., and Nematodirus sp.

2. In some cases there were indications that Moniezia sp. and *Thysanosoma actinoides* were sufficiently numerous to be considered pathogenic.

3. Various methods of parasite control are compared.

4. An alkaline anthelmintic of high parasiticidal action is described.

ACKNOWLEDGMENT

The authors wish to express their thanks to Dr. J. O. Foss of this department, to Dr. L. R. Montgomery of Casselton, Dr. E. C. Walker of Fargo, and Dr. R. E. Shigley of Minot for their helpful cooperation in this investigation. The authors are also indebted to the various sheepmen who have aided in this work.

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Clay Pigeon (Coal Tar Pitch) Poisoning in Swine

By J. W. GIFFEE
Cedar Rapids, Iowa

REPORTS of the losses of swine from eating fragments of clay pigeons on grounds used (sometimes many years before) by gun clubs seems to be increasing. In eastern Iowa veterinarians report this condition frequently.

The trouble occurs when swine have access to pastures or other grounds over which clay pigeons have been shot, and is due to the animals eating fragments of the broken discs which are manufactured from coal tar pitch. Pigs and shotes are chiefly affected.

Under the title "Idiopathic Hemorrhagic Hepatitis of Swine," Quin and Shoeman[1] reported a condition in which the liver lesions observed were suggestive of those occurring in cases of clay pigeon poisoning. Graham, Hester and Henderson[2] described the condition in pigs resulting from coal tar pitch poisoning after ingestion of clay pigeons.

F. J. Crow, Iowa City, reports that there is one farm in his territory where the soil is so extensively contaminated with broken clay pigeons that the owner no longer attempts to raise hogs on the contaminated area. On this farm, animals of all ages have been affected. Deaths occurred mostly in the younger shotes although a few sows have died. Other sows show loss of condition.

W. S. O'Brien, Ryan, planned to present two cases of this type at a recent clinic of the Eastern Iowa Veterinary Association, at Waterloo, and fed two pigs fragments of clay pigeons for about two weeks. But when the morning of the day of the clinic arrived, they were alert and apparently as well as any pigs; so he did not take them with him to the clinic. On his return home that evening one of the pigs was dead. On post-mortem examination the typical liver lesion was found. The other pig showed no symptoms at all, was placed on a normal diet and apparently remained normal.

R. M. Hofferd, Cedar Rapids, reports one case in swine pastured on ground where no broken clay pigeons were found, but the area was crossed by a gas pipeline apparently sealed with coal tar pitch.

Losses occurred on a farm in central Iowa for several years. Specimens were sent to a laboratory for examination and the laboratorian suspected clay pigeon poisoning, however, the veterinarian in charge did not think enough about it to inquire if clay pigeons had been shot on the premises. Inquiry from the owner revealed that the state shoot used to be held there.

Another veterinarian observed the liver lesions in pigs on a farm in his territory but also observed free blood in the bowel in small

There may be fragments of clay pigeons about the place, so be on the lookout for them

quantity and suspected it as being a case of incipient hemorrhagic dysentery. He was positive there had been no clay pigeons shot on this farm but when the owner was asked about it he stated there had been shooting there and on a search of the grounds we found many fragments of clay pigeons.

Frequently no symptoms of illness are observed in the poisoned animals. The pigs are just found dead. Others exhibit a tucked up abdomen, lie on their sternums, white portions of skin and the eyes are icteric. Incoordination and coma develop a short time before death.

The lesions include anemia, occasionally free blood in the intestines and usually some yellowish abdominal fluid. The liver changes are so characteristic that once seen they cannot fail to be recognized in advanced cases. This organ is cirrhotic, variegated in color from reddish green to orange-yellow, like a mosaic pattern. Punctiform hemorrhages are noted in unaffected areas and the cut surface exudes a reddish fluid, simulating red ink. The carcass is icteric.

There is no known cure for the condition once established, but fencing off contaminated areas will prevent it. Nevertheless, when one sees a mosaic liver it is a good plan to ask the owner if clay pigeons have been shot on the farm. If he does not know then look around the premises and you'll probably find the fragments.

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Evagination of the Uterus with Complications

By S. L. STEWART
Olathe, Kansas

A TELEPHONE call at five A. M. came from a farm belonging to the Kansas State School for Deaf Children. I found a 1400-pound, registered Holstein cow, down in the maternity barn with her head pushed into a corner of a stall. She was bloated to the point of suffocation. In addition she had complete eversion of the uterus and a well developed case of milk fever. Can anyone top that?

Because she had only minutes, and few of them, to live if the bloat were not relieved, I used the trocar—and quick—instead of passing a stomach tube, as is the better plan where the exigencies permit.

When the bloat was relieved, I gave the cow, hypodermically, a tablet containing eserine salicylate, one-half grain and pilocarpine, one grain. I then injected, intravenously, 500cc of a 25.7% solution of calcium borogluconate and before removing the needle from the vein I followed this with 300cc of a 7% solution of chloral hydrate, as a preparation of the patient for replacement of the everted uterus, which was accomplished in a few minutes. By noon the cow was standing, but still showed some symptoms of parturient paresis and was given another 500cc injection of calcium borogluconate solution. At six P. M. she was eating and complete recovery ensued promptly without further treatment.

I was asked how I could recognize milk fever in the condition this cow was in when first seen. It's easy! To begin with—bloating is a common sequel to milk fever and evagination of the uterus is a common complication. Furthermore, this cow had a day-old calf and experience long ago taught me what veterinary students now learn much easier from Udall's "Practice," which says: "Whenever any acute disease appears at the time of parturition, it should be regarded as a parturient disease until there is positive proof that it is otherwise."

When I view my practice methods in retrospect as one is apt to do around the first of the year, I am impressed with the fact that I perform my tasks with much less physical effort than I expended upon them 25 or 30 years ago. In no instance is this savings in effort greater, or probably as great, as in replacing an everted uterus in the cow. Best of all, the results of this manipulation have improved as the force employed has decreased.

An anesthetic is indispensable to a high percentage of recoveries in this operation. It is necessary in every case to observe the greatest care in reducing the size of the enormously swollen organ, in invaginating and replacing it—that just can't be done when the cow is straining as though she were trying to force a break through the Siegfried Line. Some veterinarians resort to epidural (caudal) anesthesia which is an improvement over struggling till the animal is exhausted by straining, but it does not prevent her from lying down while the operation is in progress and undoing everything that has been accomplished and thus necessitate beginning the operation all over again. With a general anesthetic of sufficient depth to prevent all expulsive efforts on the part of the cow, replacement of the everted uterus is comparatively easy, capable of accomplishment within a few minutes and without danger of lacerating the uterus or other traumatic injury to the cow. By reducing the time required for the operation the severity of the shock is lessened also.

Modus Operandi

Upon arrival at the maternity or other barn, out in the pasture or wherever the cow may be, all preparations for replacing the everted uterus are made before the cow is disturbed. A block and tackle, preferably a triple block, is the most important part of the equipment. If the cow is in a barn or near one and able to walk, the block and tackle is attached to an overhead beam, otherwise a 12-foot tripod is set up to which to attach it and a stake is driven into the ground to which to tie the cow by her halter.

Whether the cow be standing or lying down she is given a jugular injection of chloral hydrate solution sufficient in amount to completely anesthetize her. The amount required depends upon the size and physical condition of the cow and is a matter of judgment based upon experience. The halter is tied to the wall or the stake straight ahead of the animal and the block and tackle attached at a sufficient height far enough to the rear to stretch the body somewhat as it is elevated. A piece of large, old, soft rope is tied about the hocks and attached to the block and tackle, which is then tightened until the animal's buttocks are elevated to nearly the level of the operator's waist. The left side of the body should be uppermost as the uterus normally belongs on the right. The importance of having the posterior part of the

body elevated cannot be overstated. As the block and tackle are the most important part of the equipment, so the elevation is the most important part of the operation.

The uterus is then immersed in about 10 gallons of warm water (to which a couple of ounces of aseptogen has been added). In the wash boiler, held up by two helpers, the uterus

After the uterus is replaced, a large sloping necked bottle is inserted in the organ

is washed thoroughly and the placenta removed. The boiler is removed and the uterus is placed on a large, clean bath towel and elevated to position for replacement. An assistant brings the two ends of the towel together and twists them. While the assistant keeps on twisting the towel the obstetrician compresses the uterus firmly with the palms of his hands. This reduces the size of the organ very rapidly as the blood and lymph are forced back into the general circulation. This takes but a few minutes.

When the rapid decrease in the size of the extruded organ slows up, replacement should begin, not by pushing upon the center of the mass but by applying pressure at its base. The hand is pushed into the vagina, first here then there and all around the base to keep the organ going evenly and at the same time rolling back the towel which the assistant keeps taut. Soon the entire uterine mass drops back into place, being followed by the hand and arm of the obstetrician who carefully smooths out all kinks and convolutions. In some large cows it is necessary to use an obstetrical mallet to smooth out the wrinkles in the anterior end of the horn.

Smoothing out all the wrinkles is very important. If this is not done they will induce straining as soon as the effects of the anesthetic passes off and the straining will increase the size and number of wrinkles which will cause more straining, setting up a vicious cycle.

When the uterus is replaced to proper position and all wrinkles straightened out, the vulva is again washed and a capsule containing 360 grains of sulfanilamide is placed deeply in the uterus. Next a quart bottle with a long evenly sloping neck (vinegar bottles are usually available) is inserted, bottom first far into the uterus and the vulva sutured with an X suture of 4-ply linen, harness thread, doubled and twisted. The cow is then lowered to the ground, the ropes and halter removed, then she is rolled onto her sternum and braced in that position with bales of straw, until she gets up of her own volition.

The use of the bottle is important; (1) when the animal strains it is pushed against the sutures and causes pain, thus discouraging straining and (2) it prevents the vagina from being pushed back and infolding in the pelvis. This infolding when it occurs sets up severe straining like any other wrinkles.

Movement of the bottle, while it remains in the uterus, stimulates normal contraction of that organ. Usually, in five to ten minutes, the uterus will be contracted onto the bottle fairly snugly.

About 24 hours after the replacement of the everted uterus the case should be seen again. At this time the region of the perineum is washed thoroughly, the stitches removed from the vulva and the bottle, which by this time will have been forced into the vagina, is removed. A few ounces of iodized mineral oil is then injected into the vagina with a dose syringe and applied over the region externally, and the case dismissed.

It is realized that the foregoing discussion goes into greater detail than is usually accorded this subject. This is deliberate. Often I have varied from this routine and invariably the result has been less satisfactory than when it was followed minutely. The difference between good results and just fair results in replacing an evaginated uterus in the cow is very great. One should remember that not only is the animal's life at stake in this operation but also her future breeding and her milk production for the current lacation period. The cow with an evaginated uterus already has two strikes against her. She has been through an exhausting ordeal. Her circulation is profoundly disturbed and mal-distributed, she is suffering from shock which deepens by the minute, incipient infection is mounting and her vitality is at a low ebb. In addition, she has suffered mild

to severe hemorrhage. She requires prompt, expert assistance to the end that (1) the shock be checked and relieved; (2) her remaining strength be not further depleted by pain and straining or prolonged manipulation; (3) the infection be removed as may be without injury to delicate tissues and (4) the hemorrhage brought under control. The foregoing procedure will accomplish all these things well within a period of one-half hour even in stubborn cases.

"Accidental" Poisoning with Arsenical Dip

A call came May 29, 1944, to a ranch some 30 miles west of Kerrville to follow up a report of sudden deaths in a herd of Hereford cattle. The ranch foreman stated over the telephone, that he had found 14 dead cows within a few hundred yards of his pens. He revealed that he had dipped, late in the afternoon of May 27, all of the cattle in the pasture in question in an arsenical dip. Until the 29th no one had been around the pens. Seventy-four head of cattle had been dipped.

On my arrival at the ranch 20 dead cattle had been found. Autopsies of these animals revealed typical lesions of arsenical poisoning —that is, hemorrhagic gastroenteritis with mucosal and submucosal edema. Samples of the gastrointestinal contents were taken against the possibility of a question of the diagnosis. On later test (Gutzeiht) each sample yielded evidence of arsenic. It was possible to stand in one place and count 12 dead cattle. Autopsies were performed on all carcasses found and all revealed nearly identical lesions.

A group of men were dispersed through the pasture to catch all animals yet living in order that we might treat them. It was soon apparent that it was much easier to find dead animals than live ones. Only 12 live ones could be found. Each was given 60 grams of sodium thiosulfate orally and 10 grams of the same drug intravenously. Two of these died before the end of the day, leaving only 10 of the 74 animals living 48 hours after dipping.

During the excitement little could be learned about the dip, but late in the afternoon we learned that the vat had been completely cleaned, filled with clean water and charged with concentrated dip to make a standard "19" dip (0.19% sodium arsenite). It occurred to me that it was hardly likely that such a dip could have killed such a large number of cattle unless each one had swallowed some dip and that seemed very unlikely. Samples from the vat were taken, one without stirring, one after stirring. The former sample tested "38" (0.38% sodium arsenite), the latter tested "41" (0.41% sodium arsenite). It was then obvious why the cattle died after dipping, but the question now raised was how the vat could have supposedly been charged to "19," yet prove on test more than twice that amount.

Prolonged questioning then revealed what a lack of horse sense and an inadequate knowledge of procedure can lead to. As most of us know, the test kit furnished for the testing of vats includes a 25cc graduate, a small jar, some starch tablets, a bottle of N-20 iodine solution and a direction sheet. The test is a titration of iodine against the unknown, starch being used as an indicator to show when the end point is reached. The test is complete when the solution turns blue as free iodine is liberated in the mixture. The number of cubic centimeters of iodine solution used to obtain the end point is translated directly into one-hundredths of one percent.

The instruction sheets do not warn the operator to add more than one graduate of iodine to the mixture if 25cc is not sufficient to bring the test to completion. They assume that the operator has sufficient horse sense to do so. Since I have seen so many men perplexed because the reaction could not be completed with 25cc of iodine solution, I cite this occurrence as a prime example of negligence in not including this simple warning to the layman.

The man who did the "testing" on this ranch had charged the vat with sufficient concentrate to make it test above "25" before he ran a test. Therefore, when he ran his first test he could not complete the reaction with 25cc of iodine solution. Reasoning in reverse, he decided that the dip was too weak to test and added more concentrate. Each attempt at a test was, of course, a failure. After adding all the concentrate on the ranch to the vat and not obtaining a test, he reached the end of his rope. Then, instead of admitting that he was stymied, he took some of the dip in a jar, shook it, and "studied" the foam. After some minutes of deliberation he said, "H——, boys, she is still too weak, all we need is another five gallons. Probably about '16' and will kill the ticks and not the lice. Run 'em on in." The rest of the story has already been told.

Of the 10 animals living after this holocaust not one was worth keeping. The entire body of each animal was blistered. The skin peeled and cracked and screw-worms had a summer holiday.

In all, this bit of stubborn ignorance cost $8,600 in dead animals beside the loss in reproductive capacity of sixty good Hereford cows and four heifers . . . a great boon to the war effort, indeed.

The inclusion of *specific* and *complete* instructions on how to test dip with each dip kit could, and might have, prevented this occurrence, although the individual was to blame for proceeding without a definite and complete test.

Since this loss received widespread publicity perhaps many ranchers will be more careful and, it is hoped, that the dip manufacturers will in the future make an effort to provide more complete instructions.

R. D. RADELEFF

Kerrville, Texas

Torsion of the Uterus in Early Pregnancy

A heifer was bred June 15. August 24, 10 weeks later, she commenced to strain violently. After two days, the owner, suspecting constipation and an intestinal obstruction, administered a quart of raw linseed oil as a drench. The following day, due to continued straining, he gave her a purgative consisting of 150 grains barium chloride, 45 grains nux vomica and 125 grains of podophyllin.

When presented for treatment two days later, the heifer was alert and active and resisted all restraint. The mucous membranes were congested, temperature 103.8° F., pulse 125, respiration normal. A severe diarrhea was evident and the animal showed marked dehydration. Frequent straining, in the form of powerful abdominal contractions, were noted and intense pain was evidenced when pressure was applied to the abdomen.

Upon rectal examination the uterus was found to be revolved upon its long axis and the right horn was gravid. The point of torsion, as in most cases, was in the vaginal region, just posterior to the cervix. The tightly stretched broad ligament could be felt passing from the lumbar attachment downward and under the uterus. The vagina which, due to the torsion, was explorable for only a few inches, was hot and inflamed. A diagnosis of torsion of the uterus was made and a 360 degree revolution to the right was suspected.

Since the arm could not be inserted through the vagina and into the uterus, usual methods of overcoming the torsion were eliminated. Preparations were made for a surgical operation, as it was hoped the torsion might be successfully overcome by means of a laparotomy. Such operations[1] may succeed in those instances where adhesions have not occurred to prevent righting the twisted organ. The operator, in such an operation, reaches down between the abdominal wall and the uterus, as far as possible alongside and beneath the organ and attempts to manually revolve it into normal position.

The laparotomy, following the usual preparations for an aseptic operation, was performed in the abdominal floor just lateral to the midline, and the abdominal cavity was explored. An extensive peritonitis was found. Adhesions had so firmly bound the uterus to the peritoneum and viscera that any attempt at overcoming the torsion was useless.

The owner, upon being informed of the hopeless condition of the animal, readily agreed to immediate euthanasia. This was accomplished by the intravenous injection of 500cc of a saturated solution of magnesium sulfate.

The right torsion, as diagnosed, was confirmed on autopsy. A copious amount of serohemorrhagic fluid was found in the peritoneal cavity. The peritoneum was roughened with fibrous thickening and extensive adhesions between the peritoneum and uterus were noted. The bladder was greatly distended due to obstruction of the urethra through pressure. The uterine wall was necrotic and easily torn. Purulent decomposition of the fetus had occurred and the uterus was filled with a gray, putrid exudate.

Although torsions of the uterus are relatively numerous, this case is unusual in that it occurred in a young heifer in the first 10 weeks of pregnancy. DeBruin[2] states that torsion of the uterus occurs exclusively in the pregnant cow in the second half of the period of gestation and in the majority of cases immediately before parturition. Other sources indicate that it is usually met with in cows which have calved repeatedly and rarely in heifers during their first gestation period.

In a large percentage of cases of torsion of the uterus, the only symptoms are those of a severe colic. Since these are not diagnostic without the aid of an examination of the uterus itself; the value of a rectal exploration is evident. Without rectal examination, many torsions are likely to be diagnosed and treated as intestinal disturbances.

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ORVILLE E. GERNAND

Markleville, Ind.

Management of Shock in the Dog

By LOUIS R. BECKER
Phoenix, Arizona

PRECISE concepts concerning shock in the dog now make possible more accurate diagnosis and more effective treatment of this ailment than formerly. The opportunity afforded by the many cases of shock being brought to this writer was used to advantage to test the efficacy of external heat, administration of fluids, and selective chemotherapy.

Shock may be defined as "a depression or cessation of the influences of the nervous system over various important body functions, principally the circulation and respiration" (Taber). It is usually a circulatory deficiency characterized by a decreased blood volume, decreased cardiac output (reduced volume flow), and increased concentration of blood (loss of plasma).

The more common types of shock, seen in small animal practice, is neurogenic or primary shock due to acute circulatory failure brought on by trauma or surgical procedures. There is in these cases vasodilation, normal or slowed pulse with no appreciable loss of circulating blood. In many cases there may be no immediate shock visible but in three to 24 hours following hemorrhage, dehydration, toxemia, injury, bruises, or sudden environmental changes, a delayed or secondary shock sets in. The degree of shock may vary from slight to very profound and occasionally may result in death. Almost every injury, bleeding, pain, fright, anesthesia, or surgery is accompanied by some degree of shock and consequently should be treated promptly.

Diagnosis of shock should be determined by the history of the case and clinical examination. The more common and outstanding symptoms of shock are depression, prostration, coma, pulselessness and pulmonary deficiency. The extent of the symptoms will vary in intensity, depending upon the extent of the causative factors and upon the type of patient. The patient will usually appear cyanotic; the eyes may appear to lose their lustre; the pupils are dilated; the pulse is weak, rapid, and irregular; respiration is shallow and often increased in rate; the blood pressure is instantly lowered; and there may be urinary retention and incontinence of feces.

The best treatment of shock is prevention, if that is possible. The practice of rushing patients with shock to the fluoroscope or x-ray is dangerous if used routinely. Matters of diagnosis and prognosis are to be considered only after the primary treatment of shock is started. Control of hemorrhage should be promptly undertaken with the use of simple methods such as: tight dressings, packing of open wounds with sterile gauze and ligation. Tourniquets should be applied cautiously and only when absolutely necessary as great harm may be done by ill-advised or improper use of them. The time of placing the tourniquet should be noted in writing so that it may be released periodically.

Heat must be provided externally because anoxia develops very rapidly when body temperature is lowered. A simple means of applying heat is by placing the patient in a blanket with the addition of hot water bottles.

The administration of fluids intravenously is highly recommended. Whole blood transfusion, when possible, is effective because the outstanding bodily change in shock is the loss of plasma. In many cases whole blood is difficult to get and keep, and, in such cases, the administration parenterally of 10% dextrose in Ringer's solution or in physiologic salt solution will act as a cardiovascular stimulant, nutrient and blood volume restorative. This solution can be prepared easily and kept on hand, or purchased through the usual supply sources. This intravenous medication should be given very slowly to avoid collapse of the heart. The drip method of infusion is preferable—the amount varying from 250 to 500cc in 24 hours. Infusions of saline and dextrose serve as a means of quickly restoring blood volume and at the same time has the added value of acting as a vascular abluent. The energy of the organs and body in general can be maintained at a fairly high level for a considerable period through this method of supplying fluids and carbohydrates.

Pain is to be relieved by morphine in small doses, ⅛ to ¼ grain, administered hypodermically. Bromides are effective. Stimulants such as: aromatic spirits of ammonia, epinephrine, camphorated oil, strychnine, or other drugs in the veterinarians' therapeutic armamentarium may be used except in cases of internal hemorrhage or in head injuries.

If the patient is subsequently to have an anesthetic, the barbiturates (pentobarbital sodium) intravenously, are safe if given carefully. Local anesthesia also may be used. In fractures temporary splints without attempt at reduction should be used.

Shock is no contra-indication to the use of the sulfonamide derivatives; they should be used wherever possible because their capacity, when applied locally, to prevent the development of infections in contaminated wounds.

Clinical Reports

Lipoma in a Dog

August 12, 1944, a 10-year-old, female Beagle weighing 45 pounds was presented for treatment showing a large swelling low down on the ventral surface of the neck. The owner stated that the swelling had started about one and one-half years previously.

The dog was given a complete physical examination but nothing of great significance was noted except that she was excessively fat. Closer examination of the enlargement revealed a pseudo-fluctuating swelling. An exploratory puncture with a hypodermic needle was made but revealed no fluid or purulent material of any sort. No specific diagnosis was made, but the owner was informed that it was

Frontal view of Doctor Wertz case

undoubtedly a tumor or cyst and advised surgery. The owner consented so the dog was left in the hospital.

Two days later the dog was placed on the table and prepared for operation. Fifteen cubic centimeters of 1% solution of procaine hydrochloride was injected subcutaneously over the operative area. After waiting for the anesthetic to take effect, a three-inch incision was made through the skin and subcutaneous tissue. By blunt dissection a large mass of tissue, which was located subcutaneously, was easily removed. There was very little hemorrhage as a result of the operation. This tumor was fat tissue or a lipoma and weighed 1.8 pounds. There was an area of hemorrhage on one side of the lipoma. Mattress sutures using braided silk were placed in the skin and subcutaneous tissue. The dog was removed from the table and placed in a cage.

The after care consisted of general supportive and wound treatment—the wound being cleaned every day and antiseptics applied. Sulfanilamide powder was applied the second day and after that the area was cleaned with a 1% chlorine solution and 5% sulfathiazole ointment applied. On the fourth day after the operation the sutures were removed. The dog made an uneventful recovery and was dismissed on August 25.

WESLEY H. WERTZ

Sedalia, Mo.

Veterinary Medicine Is Really Good

One stormy night last March I received a call to treat a valuable Brown Swiss cow. I found her in deep coma from parturient paresis and with a complete eversion of the uterus.

No use to describe my treatment. It was simply routine but was promptly effective.

On my way home I got to thinking about the achievements of modern veterinary medicine and was very proud of them.

Here was a valuable animal afflicted with two serious ailments at the same time, either of them fatal if untreated and yet in an hour, as a result of modern veterinary treatment, she was well on the way to recovery. In a few days, as it turned out she was in the milking line, making a profit for her owner.

REMBRANDT MORGAN

Winfield, W. Va.

Cellulitis—Phlegmonous Stomatitis

History.—A Jersey cow, four years of age, was presented for treatment April 29, 1944. The animal, one of a herd of non-lactating milk cows, had been turned on pasture a week previously. She appeared normal at that time, and in good conditions. Three days later, while looking over his herd, the owner noticed a large swelling in the intermandibular space of this cow and drove her to the barn. She exhibited complete inappetence, refusing all food and water. She showed no progress in the days that followed and, believing she would probably die soon, the owner brought her to the hospital.

Symptoms.—When she appeared at the hospital, she was extremely emaciated, dehydrated and showed incoördination, depression,

and staggering when forced to walk from the truck. The maxillary region was swollen so extensively it was with difficulty that the halter could be kept in place. It is doubtful that she had eaten or drunk since the swelling had developed. Her temperature was 103° F., pulse 40 and respiration 16.

Long strings of mucous and saliva drooled from her mouth. The lips were separated by a protruded swollen tongue with a reddish, swollen mucosa. The odor was putrid and fetid. On palpation, the swollen area was firm and edematous and not fluctuating like an abscess. The animal gave no indication of pain when the area was pressed.

Diagnosis.—Phlegmonous stomatitis, due to an injury or infection.

Prognosis.— Unfavorable, due to the fact that she was in such an extremely emaciated condition from inanition.

Treatment.—She was given, intravenously, one ounce of sodium iodide in 500cc of 25% dextrose solution and a few minutes later one ounce of sodium sulfapyridine in 500cc of distilled water and five gallons of water via the stomach tube. There was little sign of improvement from this treatment. The following day she again received 500cc of 25% dextrose solution and 1000cc of saline solution (physiological) intravenously. Again, five gallons of water were given *via* the Stomach tube. The swollen area was shaved, disinfected, and prepared for operation. An incision was made dissecting lengthwise the intermandibular space over the swollen area, and instantly a large quantity of fetid, reddish, serous fluid escaped from the opening. A sterile tube was used to collect some of the fluid for culturing.

Five cubic centimeters of tyrothricin was diluted in 100cc of water and injected into the tissues around the incision.

The following day the same treatment was given except the 5cc of tyrothricin was diluted in 200cc of water before injection into the swollen area. Mild tincture of iodine was swabbed over the side of the incision to remove all débris and disinfect the wound.

The third day a second swelling appeared over the brisket region and, upon opening, the same type of fluid slowly escaped from the incision. It, too, was treated with tyrothricin and a mild tincture of iodine. The animal was again given dextrose and saline medication intravenously.

The next three days the animal was treated was dextrose and saline intravenously, tyrothricin injected into the tissues, and water *per os*, with but few signs of improvement.

On the seventh day the cow showed slight improvement and the treatment was continued.

The following day there was marked improvement and the animal made frequent attempts to drink and eat.

The ninth day she drank a bucket of water with a slow sipping action and ate a quantity of ground feed, also.

The results of the cultures were entirely negative. No growth was visible on: MacConkey's eosin methylene blue, meat infusion, blood agar or Salmonella-Shigella agar.

The animal made an uneventful recovery.

MELVIN F. SCOBY

McPherson, Kans.

★ ★ ★ ★

★★★ BUY WAR BONDS ★★★
AND HOLD THEM

★ ★ ★ ★

Lymphocytoma in the Dog

A five-year-old, male, German shepherd dog was presented at the hospital with a history of a depression which, five weeks previously, began to appear under the right eye along with the loss of sight in that eye. The dog was taken to a local veterinarian and removal of the eye was advised. This was done, but it failed to check the condition. Facial paralysis began to develop first as a slight drooping of the lip and progressing until there was complete facial paralysis of the left side. A gradual loss of hearing was evidenced first in the left and then the right ear. Accompanying this loss of hearing there was marked staggering and general loss of equilibrium.

When presented the dog was completely blind and deaf and had not eaten for four days. The animal was generally very weak and depressed. The temperature was 101.5° F., the mucous membranes were normal and there were no enlarged lympth glands discernible. There was atrophy of the muscle over the temporal bone on the left side. The owner requested an autopsy to determine whether or not it was a contagious condition from which the animal was suffering.

An autopsy revealed the scutularis muscle on the left to be much smaller and paler than the corresponding one on the right. Blood tinged spinal fluid was found, upon opening the spinal and cranial cavities. At the base of the cerebellum, immediately behind the pons and covering the abducens, facial and auditory nerves, was a greyish white tumor approximately 5cm in diameter. A section of this tumor was made and it was determined to be a lymphocytoma.

Injury to the roots of the acusticus, of course, accounts for the loss of hearing and equilibrium. Injury to the facial nerve caused

the facial paralysis and atrophy of the scutularis muscle. The loss of sight and the blood tinged spinal fluid cannot be explained so simply. It may have been that the optic nerve was the first to become involved and that the other involvement was a result of metastasis, but macroscopically the optic nerve showed only atrophy.

WILEY B. TANNER

Urbana, Ill.

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Tetany, "Grass Staggers" in Solipeds

Although a condition in milk cows termed "grass staggers" has received much discussion in veterinary literature of recent years, I have not observed it in this section of the South. As I have been on the alert for it for a number of years and have not detected it, the conclusion seems justified that, as described elsewhere, particularly in Britain, Australia and New Zealand, "grass staggers" due to magnesium deficiency does not occur among cattle in Northern Mississippi.

A commonly occurring condition in mares in our practice is "grass staggers" or tetany. In 35 years of practice here I have seen only three or four cases in the gelding or stallion. I recall only one case in the mule. Nearly all cases in mares occur when they are nursing young foals, heavy with foal or during the period of estrum. Most cases are seen in the spring or early summer when the mare has been on grass. It rarely happens until the mare is taken off the grass and exercised. The exercise seems to bring on an attack when the alimentary tract is loaded with succulent grass.

The condition is typical and presents all degrees of severity. In the more severe cases trismus is complete; the jaws being completely locked. All muscles of the body are in a state of contraction as in tetanus, which it resembles. From the clinical picture, however, the experienced veterinarian will readily differentiate the two diseases. The novice may not. There is a certain difference in the facial expression that is hard to describe. The eye is drawn partly back into the socket and usually the fatty pad protrudes in tetany. The facial expression presents a sleepy appearance in contrast to the nervous expression of tetanus. The gait is draggy. The animal may have "thumps." The pounding of the heart may be heard for a distance of 20 or 30 feet. Spasm of the diaphragm may be present. Mild cases recover without treatment if the animal is kept quiet. As the disease becomes more severe restlessness becomes more pronounced and the animal is unable to stand quietly, but moves constantly in a sluggish walk. These cases are fatal unless treated. Profuse sweat may cover the body and the animal will walk until it falls if not from exhaustion from the extreme contraction of the muscles.

Calcium gluconate is a specific for this type of tetany. The cure is as dramatic as in milk fever. In from 15 to 30 minutes after 400 or 500cc of the solution is injected into the jugular vein the animal becomes quiet, the masseter muscles relax and recovery is complete in a few hours. Relapse will most likely occur if the animal is exercised again with a belly full of the same kind of succulent grass under the same conditions.

While pursuing my course in veterinary medicine at the old Chicago Veterinary College neither "Pa" Baker, nor "Little Joe" Hughes told me anything about this trouble that I was soon to meet up with in my practice here 35 years ago; nor did Quitman. After seeing my first cases I wrote to these distinguished veterinarians and others, and searched all veterinary literature I could lay my hands on, for information regarding this perplexing ailment in the mare that I was running into down here in the sunny South, but to no avail. I tried almost every drug I thought of that might relax or quiet the suffering animal, including morphine, chloral hydrate and lobeline. None seemed to do any good. But late one afternoon in 1916—the year of the excessive rainfall in this section and during which I had more of the disease than in any year before or since—I hit upon a bonanza and a glorious relief. Then I could say I could cure tetany.

It was a beautiful afternoon in May. The sun was "sinking behind the western hills." I had been with the suffering mare all day and other calls were urgent. I had tried everything but she had gradually worsened all day, until now she had to be held with halter as she milled around. Methinks I would quiet her or kill her. I sent a runner to the drug store five miles away with prescription for half a pound of F.E. canabis indica. Upon his return from the drug store about dark I placed a quarter-pound of the medicine in a half gallon of warm water and pumped it into the mare's stomach through a stomach tube passed through the nostril.

In a few minutes the mare was staggering, in 20 minutes she was down practically anesthetized. A pillow for her head was made with a hay-stuffed gunny sack. I wondered what the outcome would be as I left for other calls. Back to the scene at midnight I saw the light in the farmer's house was out. My heart stood still for a moment. But as I cut off the switch of my "tin lizzie" I could hear the patient

snoring, 200 yards away. Soon the farmer was up with a light. The mare slept soundly.

I was up at dawn next morning and reached my patient just as the sun was rising. She was still lying on her pillow. Apparently, she had not moved an inch from the position in which we had left her the night before. A light tap with a switch waked her and in a few minutes she rose on the sternum, a little groggy, but soon she was picking at hay. Complete recovery followed.

From that day my trouble with tetany in the soliped largely ceased. Since that experience, I think we have lost not more than two or three cases. Since the advent of calcium gluconate injections the cure is more prompt. Putting them to sleep with cannabis indica turned the trick, I think, because it would keep them asleep and relaxed many hours. Any reasonable dose seemed to be without danger.

J. T. ALSTON

Tupelo, Miss.

Anesthetize Boars for Castration

The account* by Virgil Kelly T/4, A.U.S. Coffeyville, Kans., in which he described his easier method of castrating large heavy boars interested me greatly.

His method of restraint certainly appears to have considerable merit. However, I would like to suggest what appears to me to be an even better procedure in performing this disagreeable piece of veterinary practice.

If the boar is not too "ornery" quietly crowd him into a corner, wipe an ear with etherized cotton and slip a 20cc syringeful or more of sterile nembutal solution into the ear vein. However, if the animal is obstreperous, slip a noose onto the upper jaw behind his tusks and snub him to a post or a bar. While he is tugging and squealing it is not difficult to inject the ear vein.

Contrary to our experience with small pigs, it is not necessary for a 400 pound boar to take 80cc, the usual prorata dosage of 1cc for each five pounds of body weight. I have completely flopped 400 pounds of struggling boar with 30cc of the solution.

It is a great source of satisfaction, with such a little trouble, to have a completely quiescent patient from which the testicles may be removed with a minimum of effort to the operator and no pain to the animal. This latter effect should be striven after by modern professionalism, as against the less scientific practices of lay competitors.

F. M. WHEATLEY

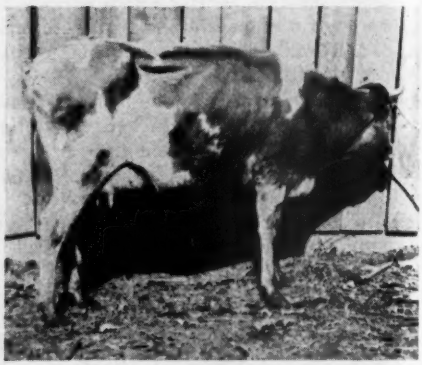
Fredericton, N. B.

*Vet. Med., 40:1, p. 24, 1945 (Jan.).

Use of Vitamin A in Treatment of Acetonemia

Since the publication of my articles[1] on acetonemia last spring I have had considerable correspondence with veterinarians concerning this disease. In the main these letters have been from those seeking more information on the use of vitamin A in the treatment of this condition. However, in recent correspondence, seven practitioners have detailed their experience in the use of vitamin A in the treatment of a total of 142 typical cases of acetonemia.

Of these seven veterinary practitioners, five report good results in all their cases, one reports good results in four cases and poor results in two cases. The seventh reports unsatisfactory results in two cases, all in which he tried it. However, in both these latter cases vitamin A was administered in doses of 30,000



The cow suffered an attack of acetonemia and was treated for a week with chloral hydrate; the symptoms subsided but she continued to lose flesh and the milk flow was suppressed. When given vitamin A she recovered promptly

I.U. twice daily for three days, which is usually a wholly inadequate dosage. On this account these two cases are not included in the following summary.

Vitamin A therapy was employed in 139 cases of acetonemia in cows and in one case in a ewe. Results were "good" in 138 cases, including the ewe, and unsatisfactory in two cases. There was no death loss among the animals treated. In 135 cases no other treatment was used. Chloral hydrate was given along with Vitamin A in the two cases. Strychnine was given in conjunction with Vitamin A in two cases. One case was given chloral hydrate for a week without improvement, then given Vitamin A and recovered in two weeks.

About one-fifth of the animals are stated to have recovered in 12 hours, most of the

[1] Patton, J. W. Acetonemia a vitamin A deficiency. *Vet. Med.*, 39:4, pp. 150-153, and No. 7, pp. 271-278, 1944.

others in "three or four days," several in "about a week" and one case—the one referred to above—in three weeks.

Other interesting information noted in these reports includes: Five of these practitioners estimate that they treat an aggregate of 800 cases of acetonemia annually. The sixth did not state the number he sees in a year. A preponderance of the cases occur when the cows are on dry feed; a minority (possibly about 15%) on pasture. Three report seeing the most cases in average producers; two find the great frequency in high producers. Two experienced the greatest incidence in cows in poor condition; two in cows in good condition, one notes no difference and one did not give this information. These six reports came from five states—Wisconsin, New York, Ohio, Mississippi and Georgia.

Many others have reported the use of Vitamin A in the treatment of acetonemia with results that were satisfactory and various veterinary supply houses have told of a large demand for Vitamin A for this purpose. Since the number of animals treated must have reached tens of thousands, it is regretted that so few have taken the trouble to supply detailed reports of their experiences, the age, breed and condition of the cow; the age of her latest calf; the history supplied by the owner, including what she was fed; the symptoms and course of the disease; the treatment and the outcome. I shall appreciate it very much if others will supply such information. As I stated in my first article on the subject there is more to be learned about this disease and clinical reports from different practitioners in different parts of the country, where feed and management methods differ, can supply much useful information.

JOHN W. PATTON

East Lansing, Mich.

Pyometra in a Bitch

October 8, 1944, a five-year-old, female scottie was presented for treatment at the Butterworth Animal Hospital, Libertyville, Illinois, with the following history:

A few months previously this scottie was taken to a veterinarian to be treated for a slightly distended abdomen and a general run-down condition. The animal was wormed and discharged. There was no improvement in her condition and she was taken back to the veterinarian for further treatment. This time she was treated for tympanites with negative results. When brought to our clinic, she hadn't eaten for the past four days and her general condition was said to be even worse.

A careful examination was made and the following facts were observed: Temperature, subnormal 98.4° F.; pulse, weak but steady; general condition poor and abdomen slightly distended. Upon palpation a semi-solid mass was felt throughout the entire abdomen. No intestinal sounds could be heard on auscultation. A vaginal examination revealed a slightly dilated cervix with a muco-purulent plug. A tentative diagnosis of chronic endo-metritis was made, subject to verification by an exploratory laporatomy.

The owner was advised of the risk involved in an operation, nevertheless she desired that a laporatomy be performed.

The animal was given intravenous infusions of dextrose and saline, and whole blood transfusions during the next 24 hours. She was then secured in dorsal recumbency and prepared for abdominal surgery.

A two-inch incision on the mid-line from the umbilicus posteriorly was made and an extremely large uterine horn was observed. The diagnosis of chronic endo-metritis was confirmed, and it was decided that the uterus should be removed. The incision had to be extended an additional three inches to permit the removal of the uterine horns and body through it. The incision was closed with two rows of interrupted sutures. A small amount of sulfanilamide powder was dusted on the wound and it was then bandaged. A transfusion of 100cc of whole blood was given immediately (plus post-operative salines). In the morning the patient drank some beef broth and in three days she was eating normally. The sutures were removed on the fourth day and the patient was discharged five days later.

After the operation the removed uterus was examined. The tissues were extremely thickened and the lumen contained a coagulated purulent mass. Each horn was approximately 18 inches in length and the smallest diameter was three inches.

We have not seen recorded a case of a uterus of such size in a scottie. The specimen which was saved fills three-fourths of a gallon jar.

S. C. BLOOM
H. G. TABLEMAN

Libertyville, Ill.

Abstracts

Anti-Influenza Immunization of Swine

Pigs given a subcutaneous injection of swine influenza virus[16] obtained from the lungs of an affected hog exhibited no clinical evidence of the disease but acquired a solid immunity to subsequent exposure and to attempts to infect them artificially.

Intranasal application of influenza antiserum conferred a passive immunity which lasted about 12 days.

DDT on the Poultry Farm

Because production of DDT has already been so expanded that within a year large quantities should be available for civilian use, tests were made[41] at the Delaware Agricultural Experiment Station in the summer of 1944 to determine the value of DDT in controlling the housefly Musca domestica (L.) and other insects. Two pens were cleaned and freshly painted with white cold-water casein paint. The walls and ceiling of one pen were sprayed with a 2% solution of DDT in deodorized kerosene, while the second pen was left untreated. After filling both pens with birds, periodic observations were made on the abundance of flies in each pen and the prevalence of fly specks on the walls and ceilings. There was a consistent striking reduction in number of flies in the treated pen. Four weeks after treatment many fly specks were on the ceiling of the untreated pen, but an insignificant number on the treated pen. Six weeks after spraying, 22 flies were counted on the ceiling of the treated pen, 480 on the untreated.

The Experiment Station farm killing room is screenless and the room is always heavily infested with flies. The walls and ceiling of this room were sprayed with a 2% solution of DDT in deodorized kerosene. In the morning all the flies were dead. A month later 100% kills still continued in the sprayed room when flies were confined to this room overnight. The action of DDT is characterized by its slow "knockdown" and kill. Evidently there is a considerable lapse of time between exposure to the insecticide and the death of the insect.

Spraying of poultry manure with DDT to control the development of fly larvae indicated DDT is equal to phenothiazine. Larvae in DDT treated manure rose to the surface and perished in large numbers. Samples of treated manure were held in wire cages and observations were made on the number of flies emerging. Treatment with DDT was effective in reducing the number of flies emerging by 90% over the untreated control.

Prevention of Bloat in Cows

The incidence[15] of bloat in lactating and non-lactating cows on alfalfa pasture was reduced to a minimum by feeding Sudan grass hay at night. Alfalfa hay was also tried but was found to be less effective, and this is attributed to the finer consistency of this hay in comparison to Sudan grass hay. The authors reaffirm their theory that belching in cattle is a reflex stimulated by the presence of fiber in the rumen and that lack of sufficient fiber produces a condition in which gas cannot escape from the rumen as belching is not stimulated.

Incidence of Trichinosis Among Foxes in Sweden

Owing to the growing scarcity of meat and in view of the size of the fox farm industry, it is likely that much fox flesh is now used for human consumption in Sweden. It is, therefore, important to assess the incidence of trichinosis in foxes. During three months in the winter of 1942-43, Hermansson[21] examined the carcasses of 7,041 foxes which were sent to Norrköping, and found trichinosis in 270 (3.84%) out of 7,025 farm raised foxes and in seven (43.75%) of 16 wild foxes. The infected farm foxes came from 27 fox farms in southern and southeastern Sweden. The average percentage of infected foxes coming from these 27 farms was 16, but a few consignments proved to be 100% infected. The proportion of infected foxes rises during the pelting season on farms where pelted carcasses are fed back to the stock. The author carried out careful retests using tissue from every group of muscles, in order to find the best site for routine examination. The anterior tibial muscle was found to be most heavily parasitized, followed by the ilio-psoas, gracilis, and other muscles of the limbs, and then the diaphragm. The author also calculated that a single test is likely to yield a negative result unless the density of infection is at least 2,500 trichinae per kg. of muscle.

[16] Agapov, S. I. Active and passive immunization against swine influenza. *Veterinariya*, No. 2.

[41] Wolfenbarger, D. O., and Hoffman, Edmund. Uses of DDT on the poultry farm. *Poultry Sci.*, 23:6, pp. 545-6, 1944.

[15] Cole, H. H., Mead, S. W., and Regan, W. M. Production and prevention of bloat in cattle on alfalfa pasture. *J. Anim. Sci.* 2. 285-294. Abst. from *The Vet. Bul.*, 14:8, p. 276, 1944.

[21] Hermansson, K. A. Experiences in the microscopic examination of fox flesh for trichinae [trans. title]. *Skand. Vet. Tidsku.*, 33, pp. 281-302, 1943. Abst. from *Vet. Bul.*, 14:10, p. 340, 1944.

Pigs are not regarded as an important source of trichinosis for man, as 26 years' observations have shown an incidence of only 0.00578% of trichinosis in swine slaughtered at Norrköping.

There have been 69 reported cases of trichinosis in man in Sweden during the past five years, but the incidence is probably higher. Everything points to the fox, particularly the wild fox, as the greatest reservoir of trichinosis. The author advocates that fox trichinosis should be made notifiable. In order to make fox flesh safe for consumption, it is necessary either to cook it well or to keep it in cold storage; a temperature of —20° C. for 26 days having been found adequate to kill all trichinae.

Crystal Violet Vaccine Effective

Five extensive field experiments[39] involving several thousand vaccinated and non-vaccinated pigs were carried out to determine the degree and duration of immunity, before and after weaning, and the effect on the progeny of vaccinated animals. Because crystal violet vaccine causes no systemic reaction it can be used safely on unthrifty young pigs. However, a low mortality may occur from a recrudescence of latent bacterial infections should animals come in contact with swine fever virus during the first few months after vaccination. The author concludes that, due to the excellent results obtained in both laboratory and under field conditions, the general prophylactic use of crystal violet vaccine against hog cholera in Great Britain is justified.—*A. H. Bryan.*

Size of Vulva and Fertility in Foxes

That a definite relationship exists between the vulvar size and fertility and the per cent of litters that survived after birth, was indicated in experiments conducted by Pearson and Bassett.[33] The survival of litters whelped by adult vixens increased by 9% for every increase in vulvar size (1/16 inch), while among yearlings such increase in vulvar size was associated with a 7% greater survival of litters. In fact, figures of the authors show that vulvar size was related to the number of pups per mated female, to failure to whelp, to the survival of litters and, probably, to litter size. Superior performance was associated in each case with large vulvar size. These facts should be kept in mind when planning matings. For example, if several equally valuable vixens are ready to be mated on the same day, the one that has the largest vulva is likely to produce the most pups. Therefore, other things being equal, it would be wise to mate her with the best available male.

[39] Doyle, T. M., McIlroy, W. J. Crystal violet vaccine against swine fever, a field trial. *Vet. Rec.*, 56:37, pp. 327-331, 1944.

[33] Pearson, Oliver P., and Bassett, Charles F. Size of vulva and its relation to fertility in foxes. *Am. Fur Breeder*, 17:5, pp. 12, 14, 1944.

Malignant Edema in Swine

Malignant edema in swine probably due to *Cl. septicum* is apparently recorded for the first time in Great Britain.[40] Hog cholera infection appears to increase susceptibility to *Cl. septicum*, with infection probably occuring *via* the intestinal tract. Infection in non-virus infected herds appears to follow inoculations or wounds. *Cl. septicum* is the most frquently causal organism, with *Cl. oedematiens* and *Cl. chauvoei* infection rare.—*A. H. Bryan.*

Hemorrhagic Septicemia in Captive Wild Animals

In 1922, in opposition[14] to veterinary advice, a batch of German hares was sent to the Skomsen zoo at Stockholm. All the hares died of pasteurellosis and in the course of the same year other animals also died from the same cause—hares, beavers, a monkey, a bear, ptarmigans, owls, capercailzies, and an eagle.

Not only mammals but birds—owl, eagle, grouse, etc., died of pasteurellosis

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The post-mortem findings varied: in all the hares there was hyperemia of the trachea and lungs and in some of them serofibrinous peritonitis or pleurisy also. In two beavers there was croupous or necrotic enteritis, with necrotic foci in the liver, and swollen spleen. The bear showed acute septicemia and the monkey croupous pneumonia, the ptarmigans acute septicemia, and the owls and capercailzies diphtheritic pharyngitis and laryngitis with necrosis of the liver and spleen.

In conclusion, the authors report the recent observation of pasteurellosis in minks and foxes, usually manifested by acute septicemia, or, particularly in foxes, by pneumonia, pleurisy, or peritonitis.

[40] Steward, J. S. Malignant edema in swine: Probably due to *Clostridium septicum*. *Vet. Rec.*, 56:36, pp. 321-323, 1944.

[14] Hjärre, A., and Sahlstedt, V. Pasteurellosis in wild animals in captivity. *Svensk VetTidskr.*, 48. p. 325. [Abst. from abst. in *Norsk VetTidskr.* 56. 26.] *The Vet. Bul.*, 14:8, p. 264, 1944.

Use of Vitamin B_1 in Canine Therapeusis

In the treatment of myoclonic convulsions, resulting from distemper or of unknown origin, neuralgia, various paralytic conditions and sundry other nervous disturbances in the dog, the use of B_1 [thiamine hydrochloride] in 10 to 20mg doses, intramuscularly, is recommended.[29] The injections are to be given daily for four to eight days; followed by one to two milligrams daily *per os* for a week.

New Vector for Neurotropic Virus

It has been shown that certain species of mosquitoes capable of the interhuman transmission of St. Louis encephalitis are capable of transmitting the virus of this disease also to fowl and pigeons. Smith[28] recently observed that a large percentage of the chickens in St. Louis County contain neutralizing antibodies of the encephalitis virus in their blood. Since few persons that have come to the St. Louis area since the severe outbreak of encephalitis there in 1937 carry such neutralizing bodies in their blood, Smith and associates deduced that the principal vector in chickens must be some blood sucking parasite that does not bite man. An investigation showed a large percentage of the common chicken mites, *Dermanyssus gallinae,* collected in flocks where the blood of birds contained neutralizing bodies, contained the encephalitis virus and when their triturated bodies were injected into mice caused typical attacks of the disease. It has already been shown that ticks infected with the virus of St. Louis encephalitis can transmit the infection to their offspring for innumerable generations. Assuming the mite, which belongs to the same order (Arachnida) as ticks, to be capable of similar hereditary transmission of the virus, it is postulated that this parasite may account for the permanence of the virus infection among fowl in St. Louis County.

Smith's discovery may possibly be of importance to veterinary medicine. The virus of St. Louis encephalitis and that of equine encephalomyelitis are closely related. Animals that carry neutralizing bodies for one in the blood commonly have neutralizing bodies for the other also. In fact, it has been suggested that in nature it may require infection with both viruses to produce clinical symptoms of encephalomyelitis. Chicken mites will attack horses, stabled with, or adjacent to, chickens. The permanent reservoir of encephalomyelitis virus has not yet been found. Outbreaks of encephalomyelitis in horses correspond even more closely to the "mite season" than to the mosquito season.

[29] Hagnéré. La Vitamine B_1 en pathologie et en thérapeutique chez le chien. *Rec. Med. vét,* 119:73, 1942.

[28] Smith, Margaret G., Blattner, R. J., and Heys, Florence M. *Sci.,* 100:362, 1944.

Underdose of Sulfonamide Possibly Dangerous

The phenomenon[43] is well known that substances toxic to cells will also stimulate the cells in sub-toxic concentrations. Accordingly, when low concentrations of the sulfonamides are administered, they may stimulate bacterial growth instead of inhibiting it and may actually stimulate an infection. This action, however, is not confined to bacteria alone. The clinical implication of this phenomenon in the use of sulfonamides is the possible danger of underdosage. It is thought that the therapeutic effect of the sulfonamides may be a combination of (1) an inhibitory action on the bacteria which are very susceptible to the sulfonamides, the drug concentration exceeding the range in which stimulation of the bacteria occurs, and (2) a stimulation of the host's tissues (bone marrow, phagocyte activity, and general tissue resistance) which are less susceptible to the compounds, the concentration of the compounds here being within range of strength in which stimulation doses occur.

Vitamin B Complex in Liver Damage

An investigation[21] of the effect of diet on liver injury was made in experimental animals. The author points out that a study of pathologic conditions experimentally produced in animals often permits a practical application to clinical medicine. From the present animal studies certain prophylactic and therapeutic dietaries are suggested for the prevention and treatment of hepatic injury in man. Methionine in doses of about 2 to 4gm daily, or cystine plus choline each in doses of about 2 to 4gm daily, was suggested. A protein-rich diet with a high content of methionine may be used in place of administration of methionine or cystine plus choline. Limitation of fat-intake and preferent use of fat rich in unsaturated fatty acids and low in cholesterol was suggested as of value in liver injury. The importance of vitamin B complex in prevention of hepatic injury is stressed. Imbalance between members of the vitamin B complex should be avoided.

[43] Henry, R. J., Mode of action of sulfonamides in infections. *Bact. Rev.* 7, p. 175, 1943. Abst. from *What's New.*

[21] György, P. Value of vitamin B complex in the prevention and treatment of liver damage. *Am. J. Clin. Path.* 14, p. 67, 1944. Abst. from *What's New.*